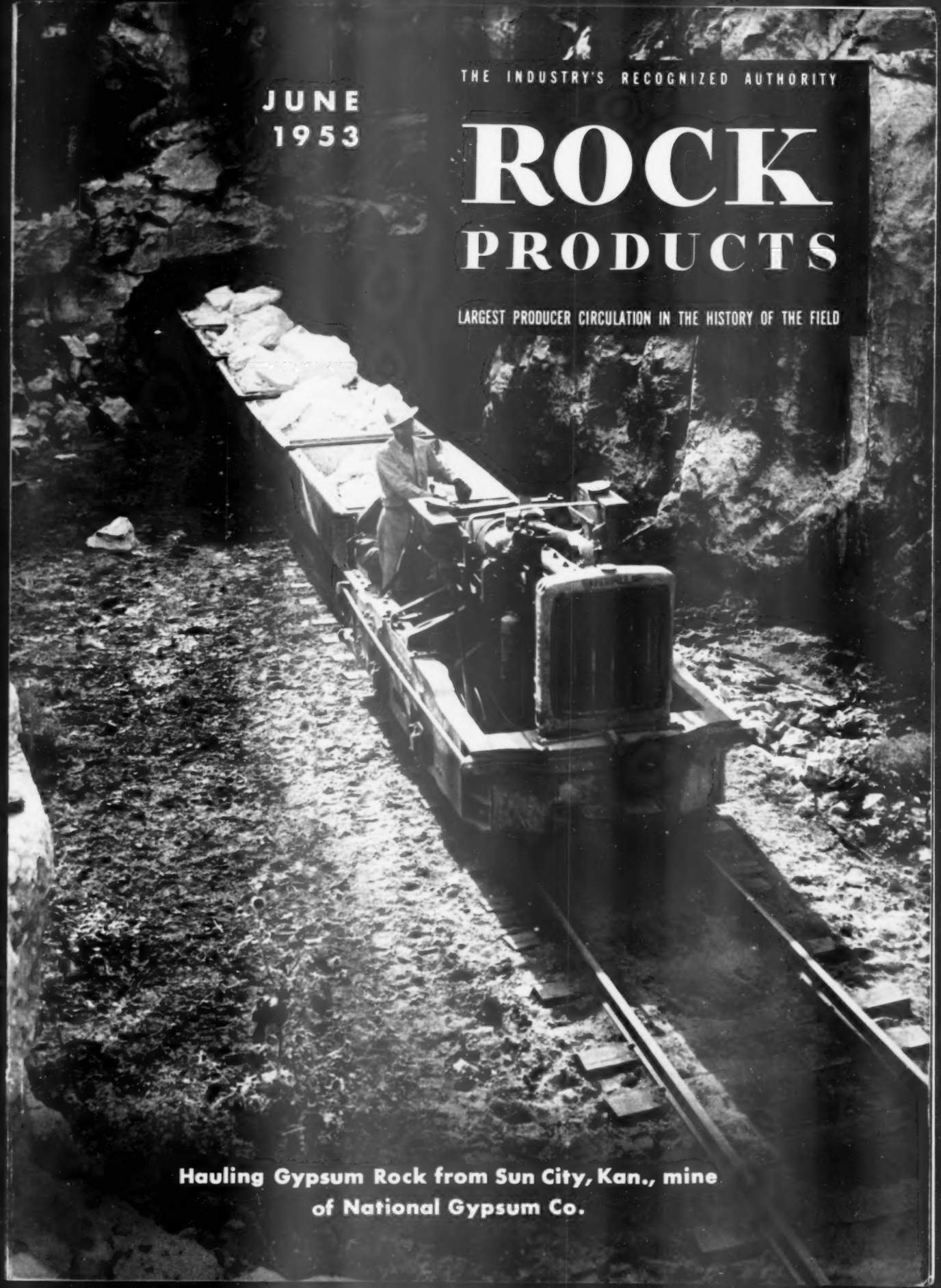


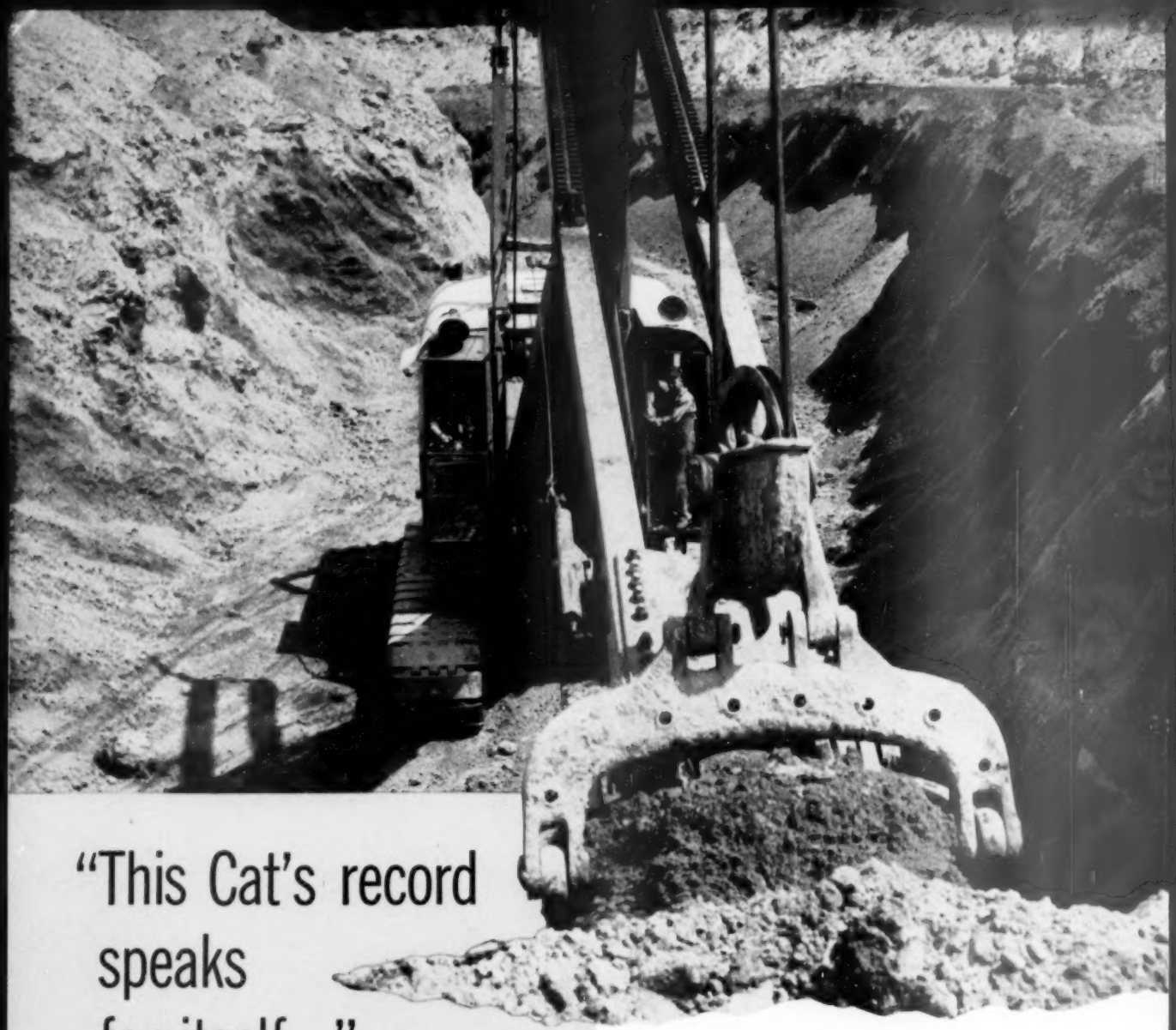
THE INDUSTRY'S RECOGNIZED AUTHORITY

JUNE
1953

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

Hauling Gypsum Rock from Sun City, Kan., mine of National Gypsum Co.



"This Cat's record speaks for itself..."

... says D. K. Pickens, whose Caterpillar-powered Manitowoc shovel is shown at an open gravel pit near Paducah, Ky. After four and a half years of dusty, hard digging, here is the record of this D17000 Diesel Engine:

LONG LIFE: More than *12,000 hours* on the meter *without major overhaul*, thanks to the simplicity and ruggedness of Caterpillar construction.

HIGH OUTPUT: Stripping clay overburden is tough, but this Caterpillar 2½-yd. shovel moves 2,250 tons in a 16-hour day.

REAL ECONOMY: Fuel consumption averages only 8 gallons per hour. All Caterpillar Diesels get full power from money-saving No. 2 furnace oil without fouling. Low repair bills mean a big saving, too.

Leading machinery manufacturers can supply Caterpillar power in their products. These rugged, reliable Diesels are available in 12 sizes, up to 500 HP and 315 KW.

Talk over your power requirements with your Caterpillar Dealer. Let him show you how it pays to standardize on Cat* power for long engine life, operating economy, and fast, dependable service.

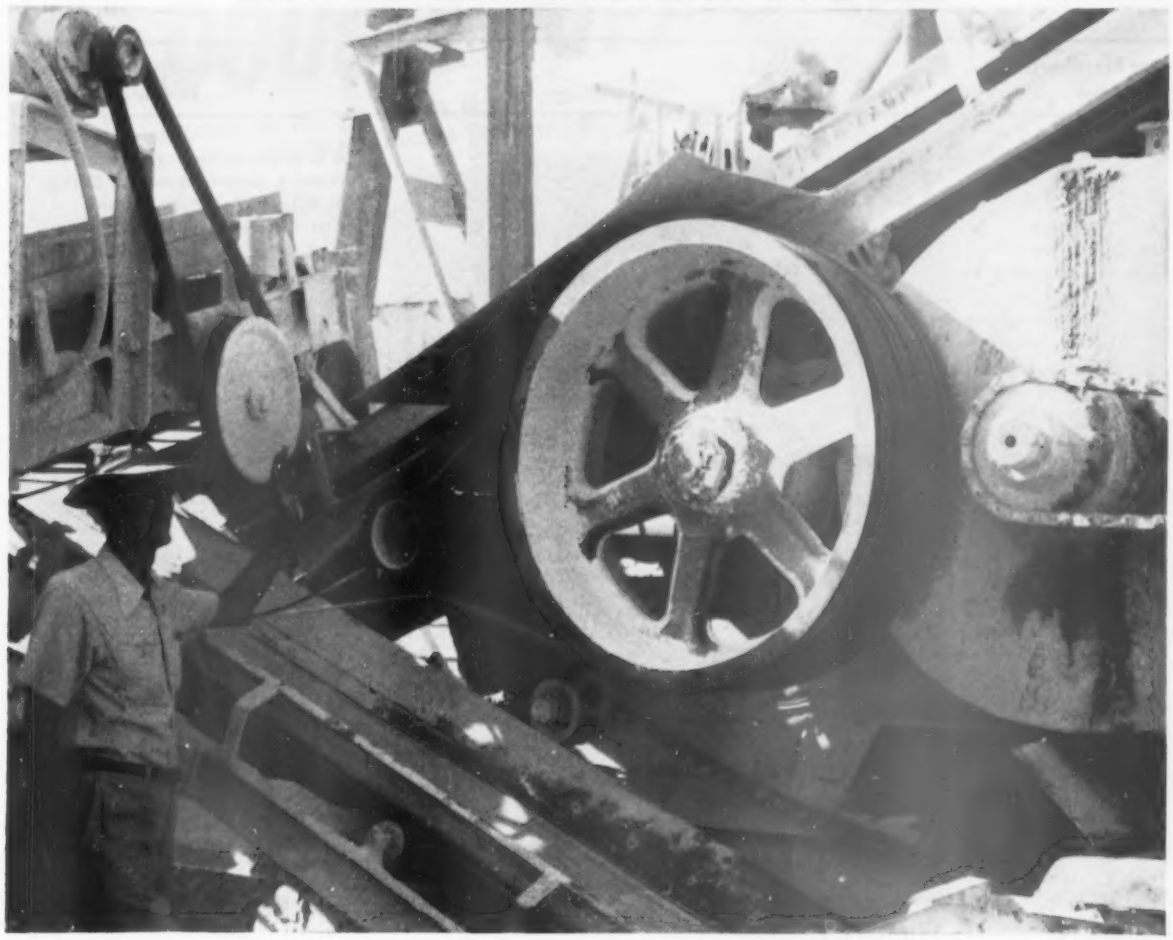
CATERPILLAR, Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

RESEARCH KEEP **B.F.Goodrich** FIRST IN RUBBER



Limestone snow makes slippery driving

Story of another B. F. Goodrich improvement in rubber

BIG chunks of limestone are crushed to fine powder in this quarry. Crushed lime helps farmers grow bigger and better crops.

A series of moving rubber belts, something like a roller coaster, carries the limestone from crusher to crusher. And a set of V belts keeps the rubber roller coaster going. But crushing the limestone creates dust so thick and white it looks like snow. And that mixed with rain or the slightest bit of moisture makes the pulley surfaces so slick that ordinary V belts couldn't grip them. The belts would slip, then burn, soon wear out.

A B. F. Goodrich distributor heard about the trouble and recommended grommet belts, developed by B. F. Goodrich to give V belt users more for their money. A grommet is a cord loop inside the belt. It is made like a giant twisted cable except that it's endless—no splices or overlaps. Grommet belts are more flexible, don't slip or stretch as much as ordinary belts. And the grommets help the belt grip better by pushing the sides of the belt against the pulley grooves. No other kind of belt has grommets; no other belts stand so much punishment or last so long.

These B. F. Goodrich grommet belts were installed, put an immediate stop to the slipping, and last 20% longer than the belts used before.

The grommet belt is a typical B. F. Goodrich improvement — an improvement that saves money, does jobs better for industries of all kinds. It's the result of day-by-day research and it's a good reason for you to get in touch with your local BFG distributor whenever you need industrial rubber products. *The B.F.Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

ROCK PRODUCTS

JUNE, 1953 — THE INDUSTRY'S RECOGNIZED AUTHORITY — VOL. 56, No. 6

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

This Month

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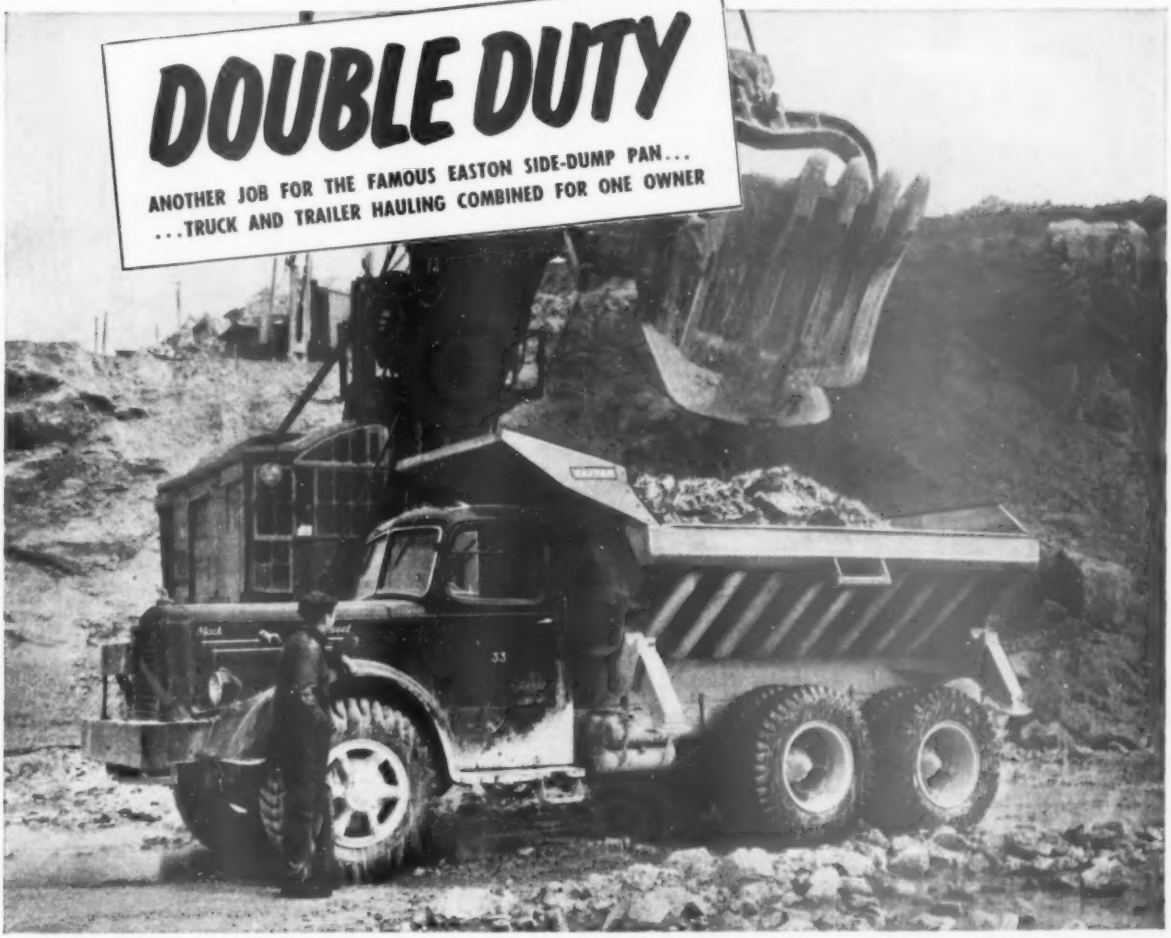
To Subscribers—Date on wrapper indicates issue with which your subscription expires. . . In writing to have address changed, give old as well as new address.

DOUBLE DUTY

ANOTHER JOB FOR THE FAMOUS EASTON SIDE-DUMP PAN...
...TRUCK AND TRAILER HAULING COMBINED FOR ONE OWNER



▲ **HERE'S PLENTY OF GO** for any grade — 15 tons in an EASTON BP pan type body mounted on a six-wheel chassis

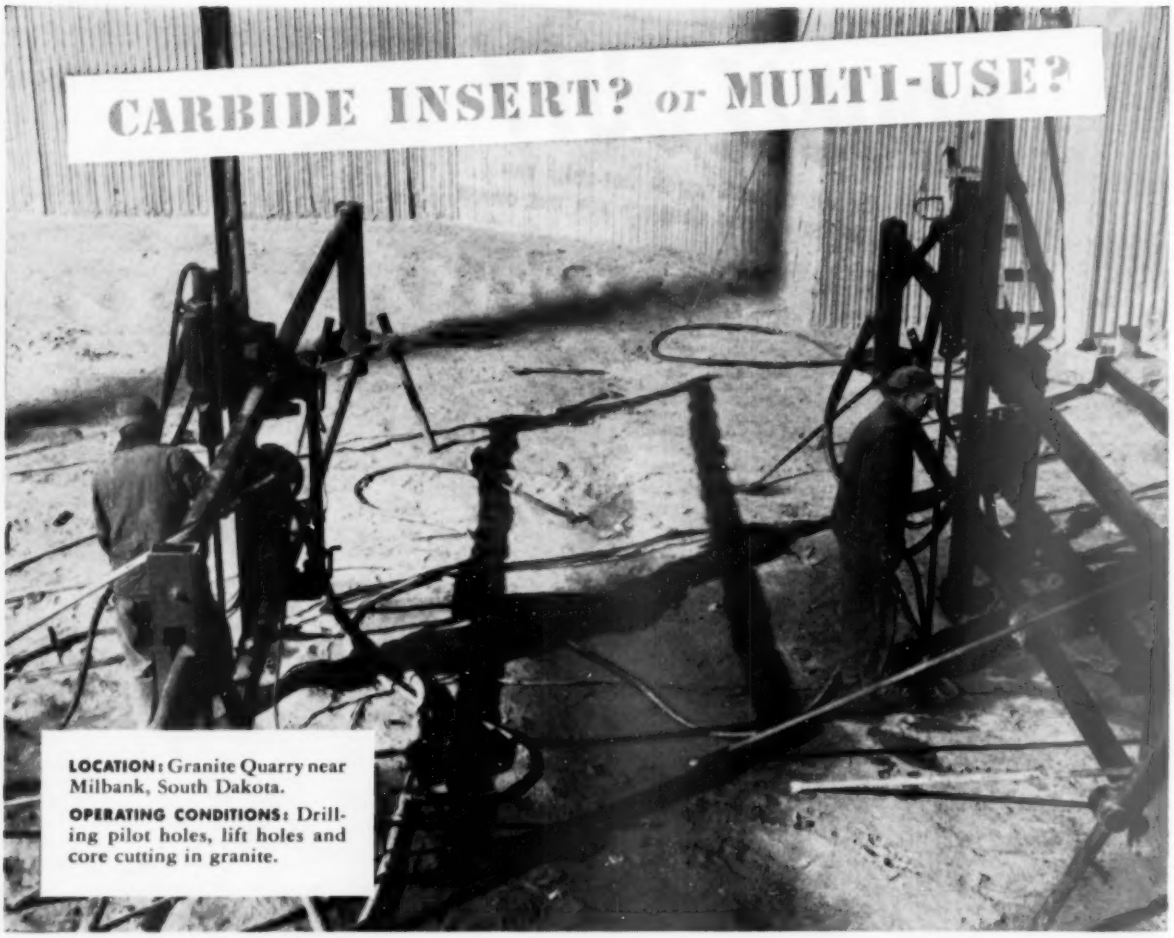
but only a side-dump can do this

▼ **DOUBLE THE PAYLOAD** — the dump body teamed with an EASTON TP trailer for another haul on the same property

YOU GET LOWEST COST PER TON when your haulage system is custom-fitted to your property. Fortunately, a qualified EASTON haulage survey costs you nothing. Why not take advantage of EASTON's broad experience? Write today.

EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.

EASTON



Melrose Granite Co. cuts drilling time 25% with TIMKEN® carbide insert bits!

PILOT hole drilling, core cutting, lift hole drilling—the Melrose Granite Company uses Timken® carbide insert bits for all these drilling jobs—and has cut drilling time 25%!

Timken carbide insert bits are always best for highest speed through hard and abrasive ground. They're most economical for constant-gage holes, small diameter blast holes and very deep holes.

But they may *not* always be best for *all* your drilling jobs!

When you're drilling ordinary ground, Timken multi-use bits are most economical! With correct and controlled reconditioning, they give you lowest cost per foot of hole when full increments of steel can be drilled.

Best of all, you can change from Timken carbide insert bits to Timken multi-use bits, easily, quickly—right on the job! As many as 93 different Timken bits in the same thread series fit the same drill steel.

All Timken bits are made of electric furnace Timken fine alloy steel and have the shoulder union developed by Timken that protects threads from drilling impact.

For help in selecting the best bit type for your job, call on the Timken Rock Bit Engineering Service. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

your best bet for the best bit ...for every job

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

IT'S THE ROCK JOBS

that prove a Shovel!

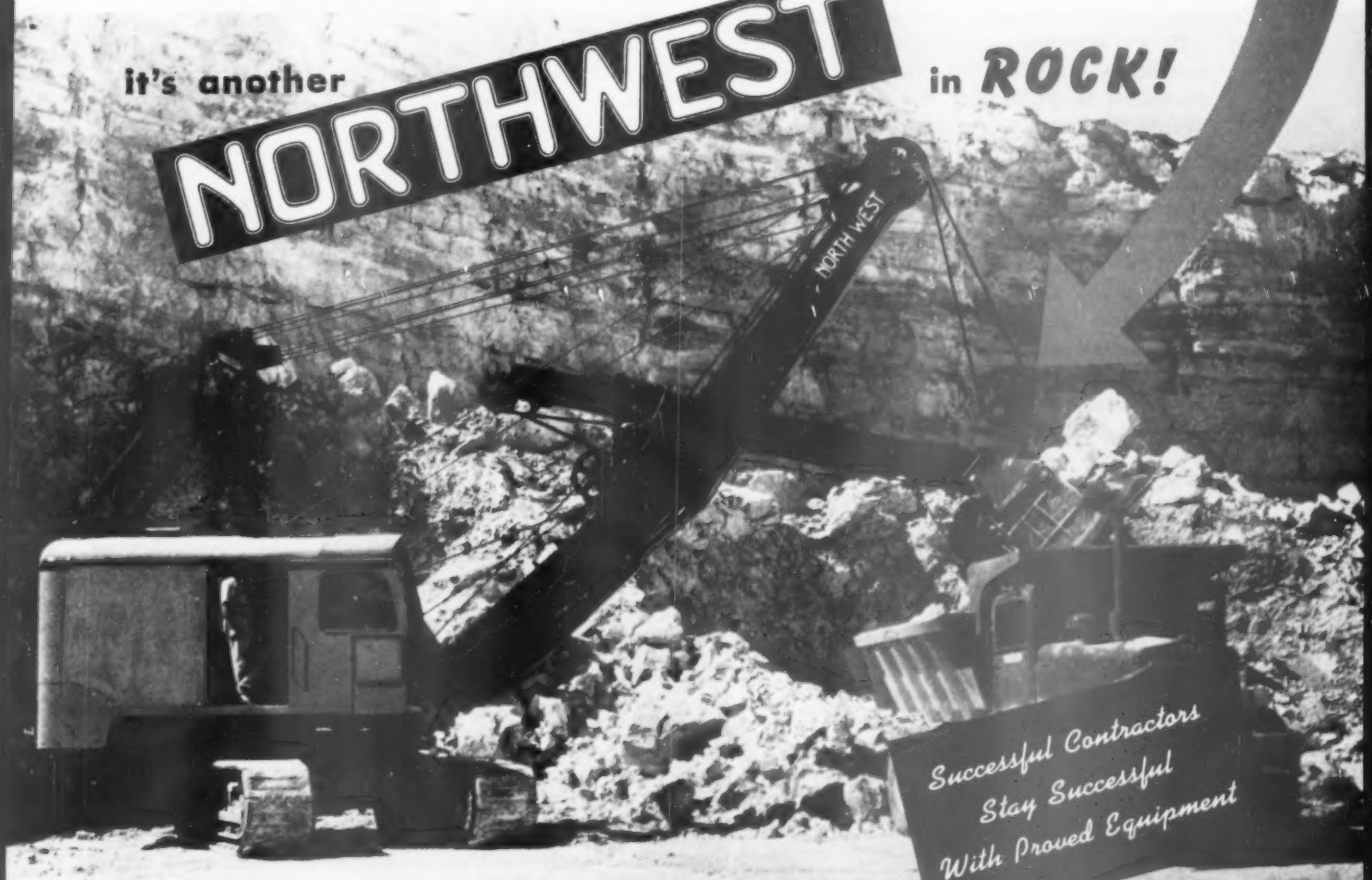
Any shovel can dig dirt! But, put it in rock! Get up on a Northwest if you know "operation". Get the feel of the controls. Feel that crowd take a-hold. The dipper goes right on through as the hoist takes it up — no "re-starts" are required here. It's a full load in one cut. Remember the Northwest Dual Independent Crowd utilizes force most other independent crowd shovels waste — force that puts greater effectiveness at the dipper lip for handling tougher digging and producing more output.

To Northwest digging power add the "Feather-Touch" Clutch Control which brings ease of operation without the complications of pumps, piping and compressors; the Cushion Clutch that eliminates shock overloads before the damage is done; Uniform Pressure Swing Clutches that cut spotting time by eliminating the jerks and grabs in swinging; Northwest simplicity of design that makes upkeep easy and reduces "down time"; and all the other Northwest advantages that make Northwest a *real* Rock Shovel.

You can plan to have a Northwest. Now is the time to find out about Northwest design and operation. Why not talk it over with a Northwest man?

NORTHWEST ENGINEERING COMPANY
1514 Field Bldg., 135 South LaSalle Street, Chicago 3, Illinois

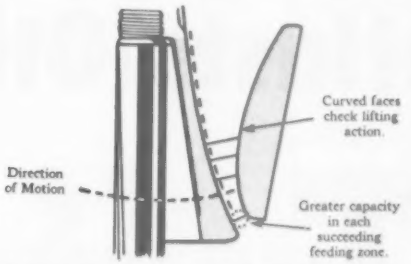
it's another **NORTHWEST** in **ROCK!**



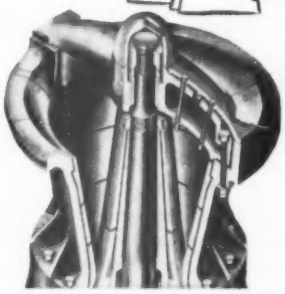
Successful Contractors Stay Successful With Proved Equipment

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BIG Production for BIG Producers



Curved Crushing surfaces reduce choking and packing because each succeeding zone in the crushing chamber of a Traylor TC Gyratory has greater capacity than the one before it. This, plus Traylor's extra heavy construction to absorb shock, results in big production . . . from 1240 to over 40,000 tons per day.



By the direct application of crushing force, Traylor's Curved Concaves and Bell Head practically eliminate lifting and churning to keep waste fines at a minimum . . . produce greater quantities of a uniform cubical product on the first pass thru the crusher.

Extra bonus comes from a Traylor TC Crusher's extremely low maintenance requirements . . . practically no down-time loss . . . even after years of daily service.

A **Traylor** LEADS TO GREATER PROFITS

EXAMINE all the construction features of a Traylor TC Gyratory Crusher at first hand. Free Bulletin 126 gives complete illustrations and specifications. Send coupon for your copy today.

Give me all the facts about the Traylor TC Gyratory Crusher described in Bulletin 126.

Name: _____

Position: _____

Company: _____

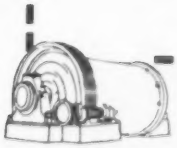
Address: _____ *State:* _____

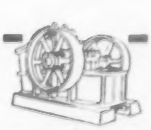
TRAYLOR ENGINEERING & MANUFACTURING CO.
595 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

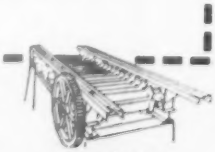

Primary Gyratory Crushers


Rotary Kilns


Secondary Gyratory Crushers


Ball Mills


Jaw Crushers


Apron Feeders

"Outlasts (Other Rope) Almost

Tuffy® Scraper Rope

Jobs like this one on the Pennsylvania Turnpike call for a scraper rope with flexibility, stiffness and super strength. Tuffy Scraper Rope fills the bill on all 3 counts.

Save Up to 50% on Rope Costs When Tuffy Takes Over

From his records of yardage and service life, this Nebraska construction company owner discovered that Tuffy Scraper Rope was giving him almost twice the service of a second rope he was using!

This meant that he could save nearly 50% on scraper rope costs by switching to Tuffy Scraper Rope!

Time after time, reports like this one show that Tuffy is paying off for thousands of other users in the construction field. And there's a good reason why: Tuffy Scraper is *specially made* to stand up under the strains and stresses imposed by wheeled scrapers . . . it's *not* just a standard rope. Tuffy is tailored to take greater drum crushing abuse, angle pulls through swivel mounted sheaves, crawling on flanges of guide rolls and edges of sheave housing.

Tuffy Scraper is *flexible* to withstand sharp bends over small drums and hug sheave grooves. Yet Tuffy has the *stiffness* needed to resist looping and kinking when slack! See for yourself how Tuffy pays off in longer runs and lower cost. When you order just ask for:

Tuffy Scraper Rope

_____ REELS _____ FEET
How Many — Length

_____ inch in diameter.

*Name Furnished on Request.

UNION WIRE ROPE CORP

union Wire Rope corporation

Specialists in Wire Rope and Braided Wire Fabric

...2 to 1," Says

Owner of Middlewestern Construction Company*, Speaking of *Tuffy* Scraper Rope.

Road construction puts extra strains and stresses on scraper ropes that ordinary wire ropes can't take. Tuffy Scraper Rope is specially made for use on wheel scrapers.

3 More Custom Created Tuffy's For Special Uses

Tuffy DRAGLINE

Gives extra flexibility, without sacrificing quality . . . spools better and rides better on grooves, hugs drum when casting. Provides maximum abrasive resistance through finer construction technique and toughened materials.

Tuffy DOZER ROPE

A specially constructed ½" rope for tough dozer service. Mount a 150' reel just back of the wedge socket. Feed only enough through to replace the damaged part on the drum. Cut wastage of undamaged rope—cut down time one-half. Users report savings up to 300%.

Tuffy SLINGS

Patented 9 part machine - braided wire fabric construction resists knots and kinks. Stands up longer than ordinary wire rope under heavy use. Proof-tested to twice safe working load.

GET THESE FREE FOLDERS

Tear Off and Mail Coupon Today!

union Wire Rope corporation

Specialists In Wire Rope and Braided Wire Fabric

2156 Manchester Ave., Kansas City 3, Mo.

Please send the folders I have checked below.

- ☐ Tuffy Dragline
- ☐ Tuffy Scraper Rope
- ☐ Tuffy Dozer Rope
- ☐ Tuffy Slings

Firm Name_____

By_____ Title_____

Address_____ City_____ State_____

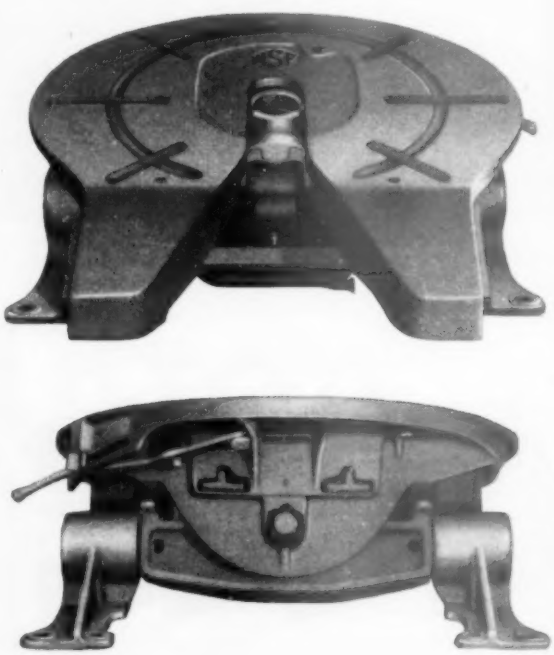
One of two tandem units, used in Marquette Cement Company's quarry at Oglesby, Ill. Heavy duty, side-oscillating ASF 5th wheels are standard equipment. Gross weight, including tractor: 175,000 pounds; gross weight hauled by front 5th wheel, 160,000; net payload, 80,000.

40,000 pounds—down the hatch!

If you are looking for an operation that punishes 5th wheels, take a look at how they're used off the highway! That's where you will find them subjected to tough service. Heavy payloads, plus continuous use day in and day out over rough roads give these 5th wheels a beating. No "beefed" up highway 5th wheel will stand up in this service!

Heart of the tandem—the ASF 5th Wheel

Here's the 36" extra-heavy-duty ASF Safety 5th Wheel made especially for the rugged service and heavy loads found in off-highway work. Cast alloy steel gives it the strength needed for handling loads up to 100 tons . . . side oscillation gives your units the flexibility needed to absorb the twisting side-strains of uneven roads.



The Marquette Cement Company proves that your best investment for safety and heavy-duty service is an ASF Safety 5th Wheel . . .

"best 5th wheel we've ever used"

Quarry work—just by the nature of the operations involved—gives most any kind of equipment a beating. And 5th wheels get their share!

As a case in point, take Marquette Cement Company's quarry in Oglesby, Illinois, where side-dumping tandem units are operated, each unit with 40,000 pounds net load. Read what Bill Spurr, Quarry Superintendent, has to say about his firsthand experience with ASF Safety 5th Wheels:

"We have been using ASF Safety 5th Wheels exclusively on our 4 tandems and 2 semi's for the last 6 years. The wheels we used before that time often took an hour or more to uncouple, but the problem was solved quickly by switching to ASF wheels. Now it doesn't take us more than 10 minutes to couple or uncouple.

"In the case of our tandem units, the front 5th wheel is often pulling over 160,000 pounds gross weight. On top of this, rough roads put a heavy, twisting strain on these 5th wheels."

"That's tough service, and these ASF Safety 5th Wheels are the best 5th wheels we've ever used."

There are sound reasons why ASF 5th Wheels can stand up in tough service. For example, the "I" beam crossbar is a recent development that helps the ASF 5th Wheel keep pace with the stresses of heavier equipment carrying heavier loads. King-pin bearing area is the largest of any 5th wheel made. Coupling is quick and easy—but uncoupling is impossible when the easy-to-see lock lever is in "locked" position. Side oscillation adds flexibility to your entire unit—tractor and trailer—so that it "rolls with the punch" instead of rigidly resisting the side strains of uneven roadway.

For complete freedom of interchange between motive power and load-carrying equipment, you can't top the quick convertibility of the *tractor trailer*. And, for the facts on the best 5th wheel investment you can make, see your nearest ASF Distributor, or write: American Steel Foundries, Automotive Division, 410 N. Michigan Avenue, Chicago 11, Ill.

remember this . . . about ASF safety 5th wheels

Largest king-pin bearing area of any 5th wheel . . . Stresses absorbed by a larger bearing area—larger than any other 5th wheel—means longer life for king-pin and jaws.

Shorter king-pin bending leverage . . . Jaws grip the king-pin at the top. The pin *stays straight*—and can't "spring" or disengage.

Side oscillation protects equipment . . . 1½° of free oscillation—plus 5½° controlled by rubber stabilizers—absorbs sidestrain of uneven roadway.

Heavy, cast alloy-steel construction . . . Plate is hinged on strong, rigid "I" beam with big 2" pin. Extra large contact area between plate and beam doubles rocker life. Both rocker and cast-steel bracket are bronze-bushed to cut wear to a minimum.

Easy to maintain in perfect operating condition . . . Wear is inevitable, but on ASF Wheels, it's easily counteracted simply by inserting one or more low-cost shims between buffer and housing front wall. Result? Like-new service, without expensive rebuilding!

A quick glance tells you the lock is LOCKED . . .

LOCKED—as quickly shown by the lever and safety latch—which can *only be in these positions* when the jaws are truly locked.

UNLOCKING—with an easy twist of the wrist. Simply move the safety latch up, and pull the lever forward.

UNLOCKED—ready for uncoupling; parts in lockset position. *Handle can only move back to locked position when the jaws are locked in the next coupling operation!*

A 3,000-pound "compression-grip" saves your maintenance dollars . . .

COUPLING — as the king-pin enters the jaws, the jaws are forced back against the exclusive ASF rubber buffer block, building up compression.

COMPRESSING — 3000 pounds are built up before the lock clears the rear jaw, allowing lock to snap to locked position.

LOCKED—and the jaws *remain* under compression. The grip is like a vise; eliminates the slack and backlash that can cost you money in added 5th wheel and king-pin wear.

There's more to tractors than meets the eye . . .

The real "pay-off" value of any tractor to its owner is how it measures up to the standards set by today's modern production methods.

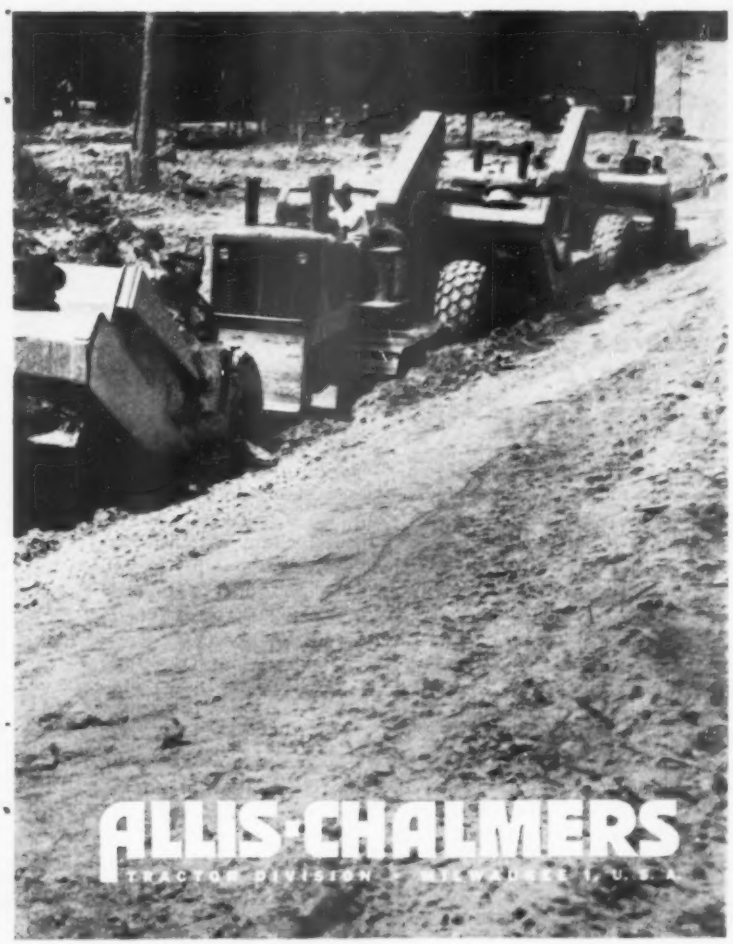
To meet these needs, Allis-Chalmers started from scratch and built *a line of tractors with a future.* Thousands now have been tested and proved on the toughest proving ground of them all, actual jobs, and they have more than measured up to expectations. Owners have found that these tractors set new standards of performance . . . that they give greater output with less down time . . . plus more profit, whether pulling, pushing, digging or dozing. Operators have discovered new ease and comfort in operation, too; and mechanics say these are the easiest-to-service tractors that they have ever worked on.

Yes, the "family circle" of users of Allis-Chalmers tractors is growing constantly. Many users who bought their first Allis-Chalmers tractor only a few years ago now have fleets of them, and many others who operate only one or two tractors have become Allis-Chalmers boosters.

This acceptance is the springboard behind a big plant expansion at Springfield, Illinois, which will enable Allis-Chalmers to meet *your* future needs. See your nearby Allis-Chalmers dealer now for the inside facts on pace-setting tractors that measure up to modern production methods.

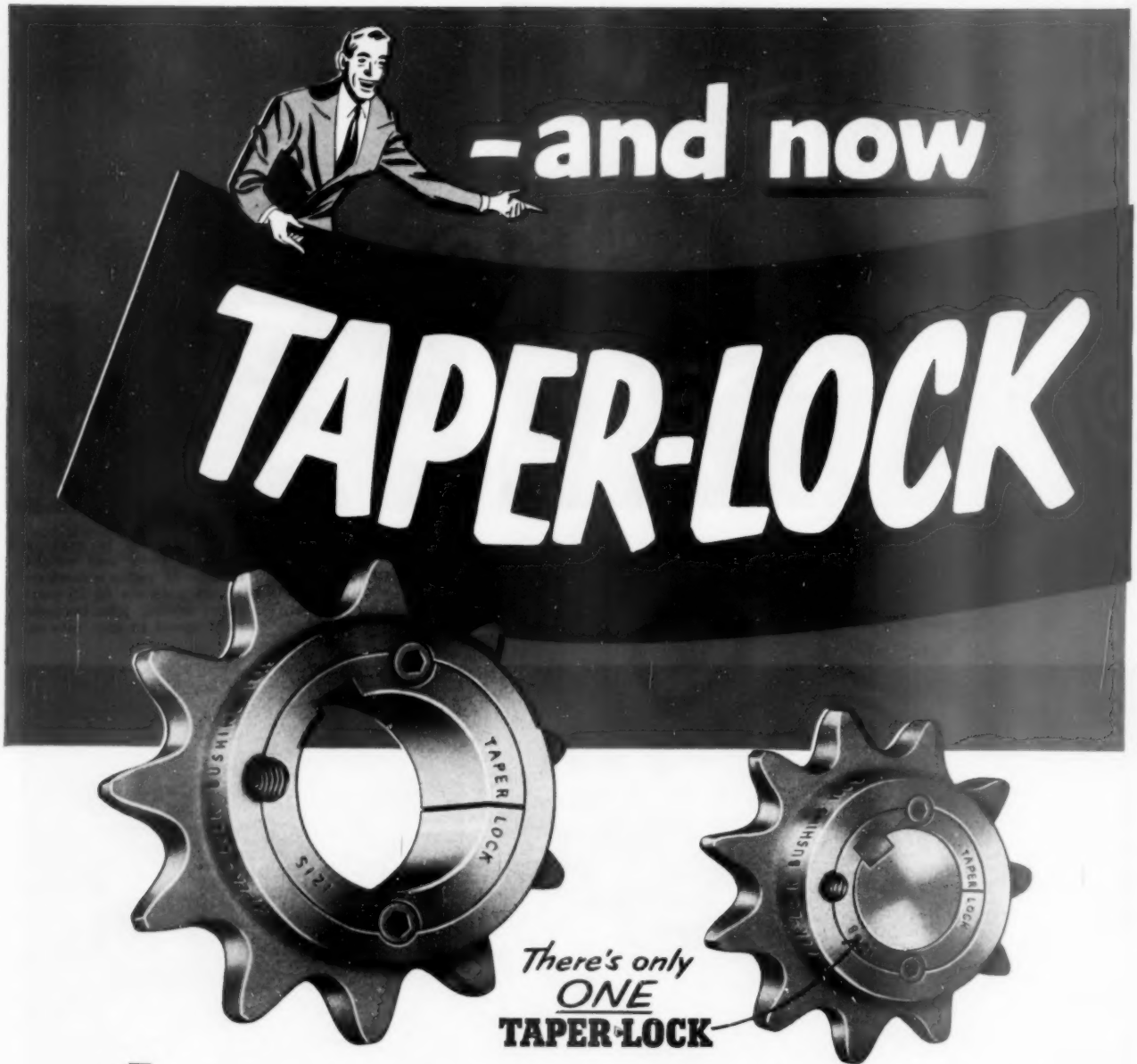
For stripping overburden, cleaning up around shovels, building access roads . . . wherever big production is essential to the job, this big HD-15 has more than proved its worth. With 109-drawbar hp. and 27,850-lb. weight, it works quickly, efficiently as a dozer, tractor-shovel, puller or pusher.

This 72-drawbar hp., 18,800-lb. HD-9 is making friends in every field because its power and weight make it an ideal size for dozens of today's modern jobs. In addition, operators can gain up to 25 percent more production on short dozing jobs because they can go from any forward speed to any reverse speed with just one shift.



The 40-drawbar hp., 11,250-lb. HD-5 is a versatile jack of all jobs above or below ground. With hydraulically controlled Tracto-Shovel, it's equally useful handling sand and gravel, cleaning up around conveyors and hoppers, loading hauling units, dozens of other jobs.

Here's real tractor teamwork . . . four HD-20's in a "train" — three pulling scrapers, one pushing — all working together for big production. With torque converter drive, they synchronize speeds at contact . . . automatically load at the fastest speed that job conditions permit, with less strain on operators and equipment. With 175 engine hp. and 41,000 lb. weight, the HD-20 is today's new yardstick of crawler tractor performance.



FROM the package to the shaft — ready, *immediately,* for the job! This is the new "off-the-shelf" availability which Dodge brings to roller chain drives. And, with this new availability, you get the important advantages of the famous Taper-Lock principle, proved in millions of V-belt installations.

No more costly and time-consuming boring of sprockets to fit your shafts! *Taper-Lock bushings are available in a range of sizes for the great majority of industrial applications.* And it's not necessary that shafts be turned and ground to get a tight fit. *Taper-Lock not only is keyed to the shaft, but grips it with the firmness of a shrunk-on fit.* Yet when a sprocket is to be replaced, it comes off easily, quickly. The bushing may be re-used.

Taper-Lock sprockets are compact. They have no flange, and no protruding parts. Taper-Lock occupies no more space on the shaft than standard sprockets. The flush design means safety.

The new Dodge line of roller chain is made to highest quality standards, by craftsmen who know chain manufacture. Both chain and sprockets are made to ASA standards. Taper-Lock sprockets will take any make of American standard chain.

Taper-Lock sprockets will be carried in Distributors' stocks for immediate delivery, in a complete range of B-type steel sprockets—½" to 1¼" pitch. The range in ⅜" pitch, for example, is 12 to 112 teeth.

All bushings and the smaller sizes of sprockets are packaged individually. Dodge roller chain is packaged in 10-foot lengths — and can be furnished in 50-foot and 100-foot reels.

For detailed information about Taper-Lock sprockets and Dodge chain drives write now for Bulletin A-624.

DODGE MANUFACTURING CORPORATION, 2600 Union St., Mishawaka, Indiana

MEASURE OUTPUT

by "Koehring Work Capacity"

There are some very simple ways to measure output of excavators and cranes in advance. Take lifting capacities, for example. Obviously, the machine with the heaviest lift capacity will not only pick up larger crane loads, it also has more stability and power to increase shovel and hoe production — handles bigger dragline and clamshell buckets on a wider work range.

Be sure to check lift ratings, and other clear-cut measurements of "KOEHRING WORK CAPACITY", before you buy any excavator or crane. Your Koehring distributor has important figures to show you — ask for them.

KOEHRING Company

MILWAUKEE 16, WISCONSIN

Subsidiaries: PARSONS • KWIK-MIX • JOHNSON

K332

lift capacities up to 79½ TONS . . . ½ to 2½ YARDS dipper capacities

NEWS from the Field . . . as reported by . . .

ARKANSAS — "2000 hours on my *600* with no trouble of any kind. Holding 100 pounds pressure while operating two 4" wagon drills." Stays on till the job is done — that's the way the Gardner-Denver *600* is built.

PENNSYLVANIA — "Have two WH600 Portables operating side by side . . . keeping the job right on schedule . . . have required only routine maintenance."

W. VIRGINIA — "In continuous service . . . and running like a watch." Starts easily — keeps on going. No tricky adjustments to require constant attention.

Contractors now using the GARDNER-DENVER 600

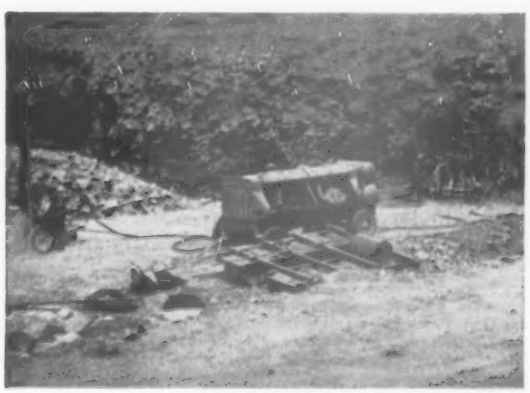
PENNSYLVANIA — "Side by side test convinced us the *600* saves fuel . . . as much as one gallon in four on our job." The *600* is economical with oil, too.

WASHINGTON — "Our regular operator required no special training to run the *600*. Well pleased with the performance of this heavy-duty unit."

CALIFORNIA — "Around the clock operation . . . have five machines in continuous service . . . very satisfactory." Ask the men who use the *600*.

CANADA — "Increased drilling footage . . . running my *600* ten hours a day with no trouble." The *600* speeds your work — increases profits.

NEW YORK — "Smooth and quiet . . . even at full capacity." Balance a 50-cent piece on an operating *600* — see for yourself how free it is from vibration.

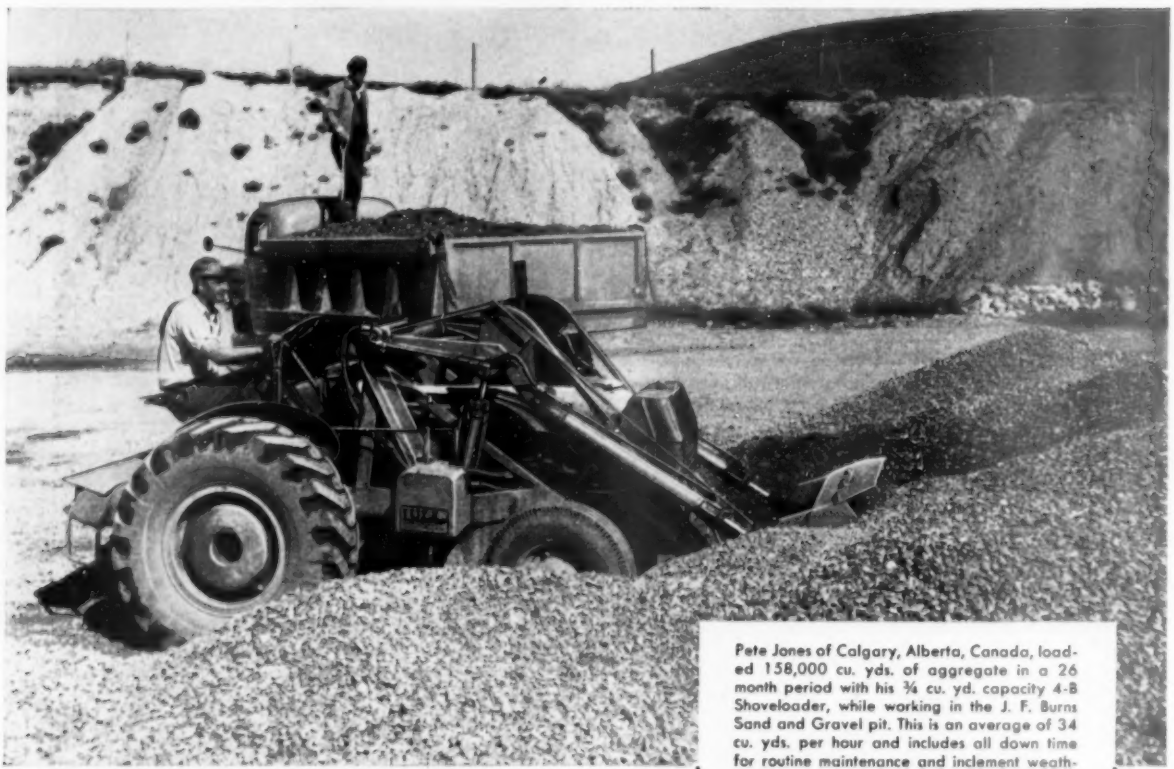


KANSAS — "Have one of the first machines built . . . highly pleased. Operating two 4" wagon drills." The *600* will see you through many a tough job.

For complete information, write to Gardner-Denver Company, Quincy, Illinois. In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 13, Ontario. Since 1859. The quality leader in compressors, pumps and rock drills for construction, mining, petroleum and general industry.

(Advertisement)

158,000 Cu. Yds. of Aggregate Loaded in 26 Months' Time



Pete Jones of Calgary, Alberta, Canada, loaded 158,000 cu. yds. of aggregate in a 26 month period with his ¾ cu. yd. capacity 4-B Shoveloader, while working in the J. F. Burns Sand and Gravel pit. This is an average of 34 cu. yds. per hour and includes all down time for routine maintenance and inclement weather. The Shoveloader is now down for its first major overhaul and still has the original set of tires. Frequent timing of the operator showed he could load a 6 cu. yd. truck box in 4½ minutes. Mr. Jones considers his Shoveloader the most efficient machine for his jobs and has now purchased another unit.

A Shoveloader® *Performance Report*

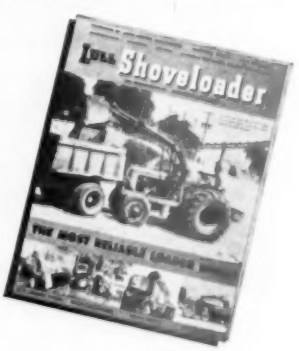
Month after month this rugged Shoveloader worked steadily, dependably delivering top pay loads every operating day. 26 months later it had proved to its owner, beyond any doubt, that it was built to take the worst in punishment while delivering the best in performance.

Inspect the Shoveloader at your distributor! See its rugged frame, its hydraulically controlled bucket, its powerful hoisting cylinders and its rugged tractor. Ask for a demonstration and see why these Shoveloaders are built to outlast and outperform any other loader!

Shoveloaders mount exclusively on dependable Case, Minneapolis-Moline, Oliver and Sheppard industrial-type tractors. Contact these distributors for complete information or send for the fact-packed bulletin.

The easily added snow and coal bucket, fork, bulldozer, crane and broom attachments keep the Shoveloader busy on dozens of jobs all year around.

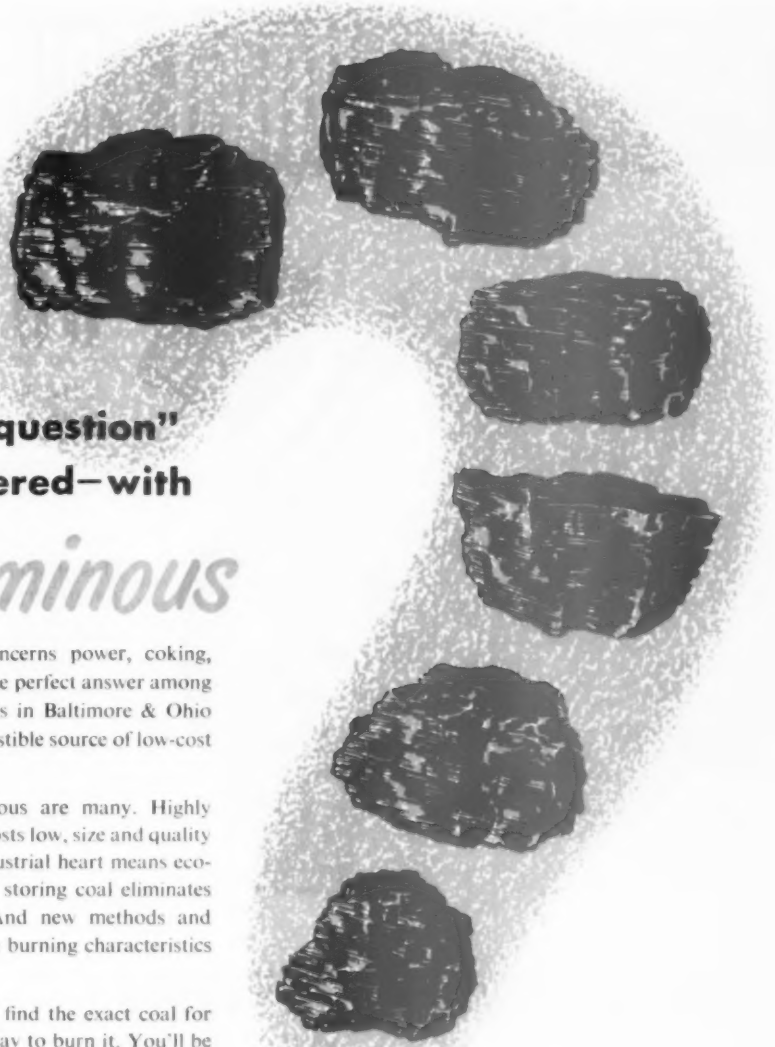
Facts and specifications on wide range of models are given in Bulletin AD-32A. Write for it today.



Baker Lull
handling equipment

THE BAKER-LULL CORPORATION
Formerly the Lull Manufacturing Company

382 WEST 90th STREET • MINNEAPOLIS 20, MINN.
A Subsidiary of the Baker-Raulang Co., Cleveland 2, Ohio



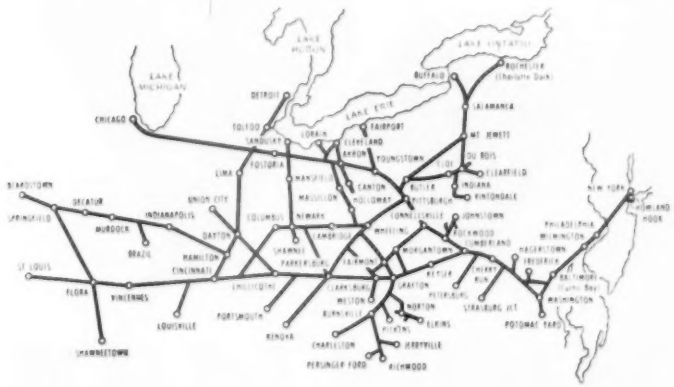
Your "burning question" is quickly answered—with

B&O Bituminous

Whether your specific question concerns power, coking, steam, or space heating, you'll find the perfect answer among the wide variety of Bituminous coals in Baltimore & Ohio territory. Here lies an almost inexhaustible source of low-cost heat and energy.

The benefits of B&O Bituminous are many. Highly mechanized mines keep production costs low, size and quality uniform. Closeness to America's industrial heart means economical transportation. The ease of storing coal eliminates the need for expensive facilities. And new methods and devices take further advantage of the burning characteristics of Bituminous.

ASK OUR MAN! He will help you find the exact coal for your purpose, and explain the best way to burn it. You'll be amazed at the efficiency, economy, and cleanliness of B&O Bituminous today.



BALTIMORE & OHIO RAILROAD

Bituminous Coals for Every Purpose

LIMESTONE AND LIME PRODUCTS

To modernize is to economize . . . and this holds good in the lime industry where you can effect definite savings over your former methods by equipping your plant with the latest type of Raymond machinery.

The Raymond line includes specialized units for direct-firing pulverized coal to rotary kilns, drying and grinding limestone, disintegrating and classifying hydrated lime . . . all with automatic, dustless operation.

SUPER ROLLER MILL

Raymond Roller Mills have long been standard equipment in the limestone grinding field . . . and today with the trend toward huge production plants, there is demand for Super Roller Mills which provide capacities of 15, 20 and 30 tons or more per hour of finished material.

These big machines offer economical advantages in conserving space, centralizing operations, simplifying material handling, also savings in installation, maintenance and supervision costs compared to a multiple mill installation of equivalent output.

•

In a recent application, a Raymond Super Roller Mill has been installed, as part of a new plant expansion program to supplement the present smaller units, thus greatly increasing daily production. This giant mill is equipped with Flash Drying accessories for handling Virginia limestone containing several per cent initial moisture. As it dries and grinds in one simultaneous process, the Super Roller Mill shows an outstanding record of low cost production of quality grades of limestone.

•

For handling hydrated lime, the well-known Raymond Automatic Pulverizer with Whizzer Separation is widely used as the standard machine in the industry. It disintegrates and classifies the lime, and automatically rejects impurities, delivering a uniformly fine, high purity finished material.

Write for further detailed information.

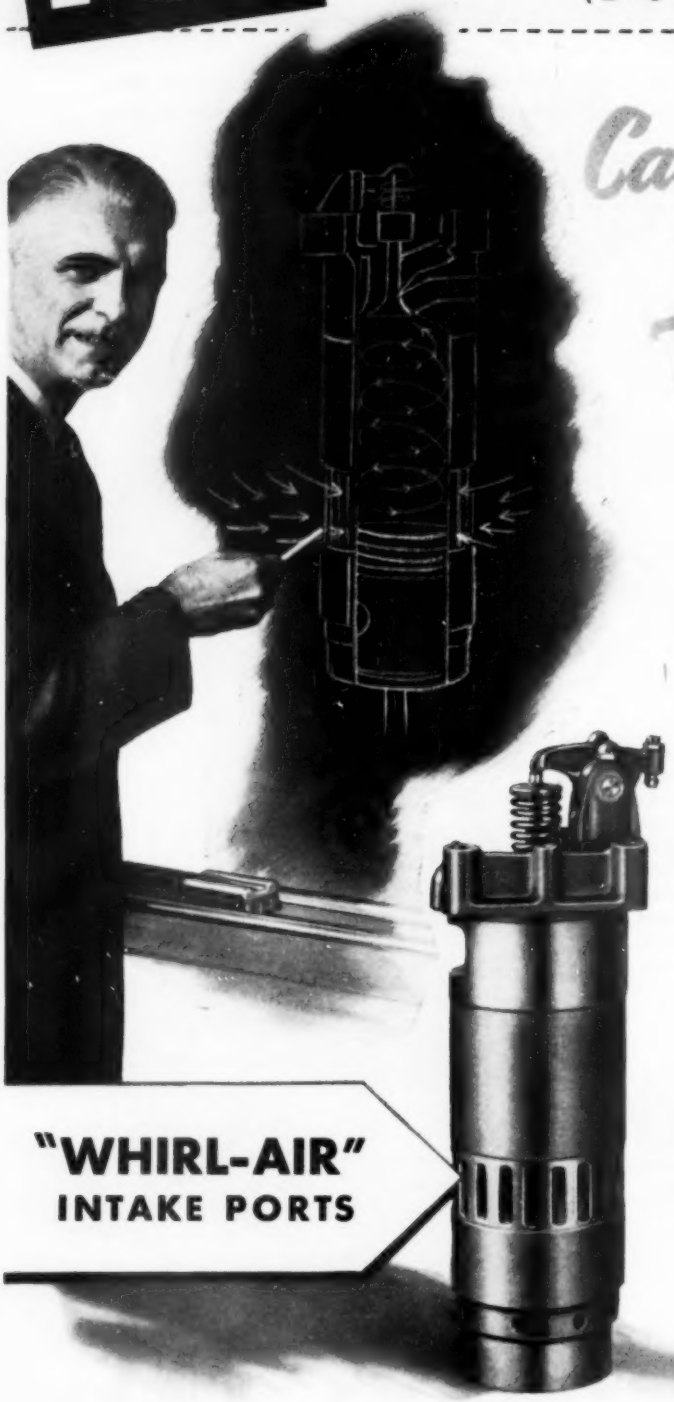
ENGINEERING, INC.

1307 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS

Sales Offices in Principal Cities

P&H Diesel Engines

(2-CYCLE)



Can your diesels tie this for Turbulence?

See those intake ports? . . . how they're machined at a compound angle? That's the basis of P&H's exclusive "Whirl-air" intake. As the piston clears these ports on its down stroke, air rushes through the ports, developing a whirlwind within the cylinder that picks up atomized fuel for the effective 2-cycle expansion stroke.

Here's turbulence at its best. More complete atomization — more complete combustion — more thorough scavenging of burned gases. More power!

P&H offers you the only 2-cycle diesels with this outstanding feature. Yet, it's only one of many advantages you'll find in this advanced P&H line . . . with 1, 2, 3, 4 and 6-cylinder models — from 20 to 138 h.p.

Ask your P&H Diesel representative for full details. Or write us.

"WHIRL-AIR" INTAKE PORTS

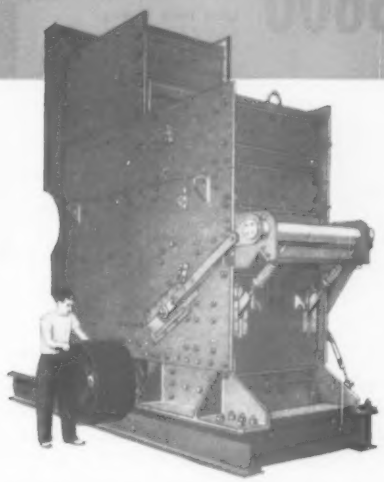
P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H Line

GREATER TONNAGES OF BETTER QUALITY AGGREGATE AT LOWER COST PER TON

UNIVERSAL'S *IMPACT MASTER* WITH CONTROLLED IMPACT ACTION

Patent Pending



GIVES YOU THESE *PROFITABLE ADVANTAGES*

1 GREATER CONTROL OF AGGREGATE SIZE

The reduction is done by the rotor hammers. The speed of the rotors governs the reduction — the greater the speed, the greater the reduction. Three adjustments control percentage of sizes within limits of the finished product.

2 GREATER RATIO OF REDUCTION

Any material freely passing into the feed opening can be reduced to specification material in one fast operation. In a closed circuit operation recirculating loads can be kept to a minimum.

3 CLEANER CUBICAL AGGREGATE

The terrific impact of the hammers produces a clean high quality cubical product. Sharp points and corners are eliminated. Clay, shale and other soft materials are disintegrated and passed off as fines.

4 LESS HORSEPOWER PER TON

Universal's Impact Master has only two moving parts — the two hammer rotors — and they both rotate freely in the same direction with the flow of material. Rock is broken by impact and the finished material is discharged immediately from the breaking chamber.

5 LOWER MAINTENANCE COSTS

With the breaking accomplished by the rotor hammers and the immediate discharge of the finished product through the deflector screen grate and lower grate, wear is kept to a minimum. Every part is readily accessible.

Impact Masters are available with capacities up to 750 tons per hour. Learn how the Impact Master can fit into your operations. Write or ask for full performance details.

UNIVERSAL ENGINEERING CORPORATION
617 C Ave. N.W., Cedar Rapids, Iowa
a subsidiary of
PETTIBONE MULLIKEN CORPORATION
4700 West Division St., Chicago 51, Illinois

UNIVERSAL GAVE CEDAR RAPIDS ITS ORIGINAL FAME FOR QUALITY CRUSHERS **IN CEDAR RAPIDS SINCE 1906**

PMCO **UNIVERSAL**

ENGINEERED FOR TOP OPERATING PROFITS

BID LOWER...handle more jobs... make more money with Bantam T-35

- **Goes anywhere fast!**
- **Digs 100′ of 5′ trench per hour!**
- **Sells for less than $6600** FOB Waverly, Ia. (plus truck & mtg.)

EIGHT profit-making machines in one!

If your *"living"* depends on your equipment, it will pay you to get complete facts IMMEDIATELY on the new Schield Bantam T-35 Backhoe. For the T-35 not only *saves you an average of $1400 in FIRST COST* (over other ⅜ yd. hoe units) . . . it also gives you a *much lower operating cost PER HR.* (including gasoline, depreciation, maintenance, etc.).

Add to these advantages, the T-35's high-speed production . . . new remote control . . . fast job-to-job mobility . . . 8 easy-change attachments . . . and you have *a money-making combination that can't be matched by any other machine.* With a T-35, you can also earn extra spare-time income on rentals, or sub-contracts.

Even if you already own larger equipment, there are dozens of spots on *every job,* where you can speed work, cut costs with a Bantam T-35. Furthermore, you'll find you can *keep your Bantam busy practically 100% of the time!* Let us prove it with a free demonstration!

58-H-21

SCHIELD Bantam Co.

216 Park St., Waverly, Iowa, U. S. A.

THE ONLY WAY TO COMPETE AGAINST A BANTAM T-35 IS TO OWN ONE!

T-35 DRAGLINE excavates 90 cu. yds. per hr. Simplifies loading trucks, feeding crushers . . . ideal tool for digging basements, drainage ditches, stock ponds, etc.

T-35 CRANE lifts 12,000 lbs. . . . works with 25′ to 50′ boom, 8′ jib, ½ to 1 cu. yd. concrete bucket. Precision power-lowering standard at no extra cost.

T-35 CLAMSHELL handles gravel and bulk materials at 80 cu. yds. per hr. . . . makes extra money digging trenches, footings . . . handles debris, scrap metal, etc.

T-35 SHOVEL gives you 90 cu. yds. per hr. production with automatic cable crowd. Saves time working roadside pits, handling road repairs, general clean-up.

This brick slashed reline time 75%!

HERE's a report on a recent check of hot zone linings in rotary cement kilns now using Permanente Periclase-Chrome bricks:

At five plants selected at random from our customer list—with capacities ranging from 1,200,000 to 3,500,000 barrels per year—Permanente Periclase-Chrome brick linings cut down-time for relining an average of 75% compared to the linings previously used!

In each of the five plants, Permanente Periclase-Chrome brick improved service—gave an average of 10 months service compared to an average of approximately 2 months with the other type brick. In addition, fewer shut-downs resulted in substantial savings in cost of materials for relining.

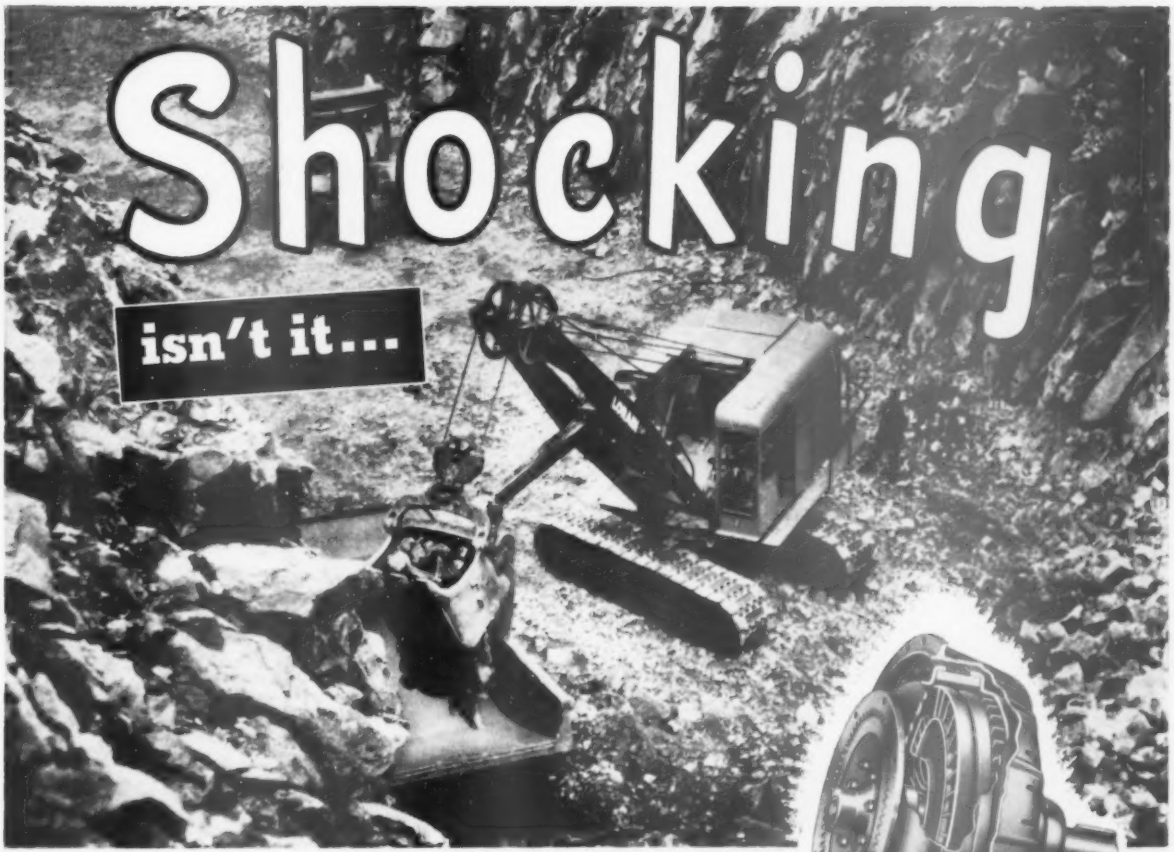
Such exceptional performance was possible because Permanente Periclase-Chrome bricks are *especially designed* for hot zone linings. This special design is the result of 10 years experience working with cement kilns throughout the country. Today, it's *your* best bet for higher production.

SEND FOR BOOKLET giving installation procedures and for literature explaining all the advantages of Permanente Periclase-Chrome bricks. If an appraisal of your kiln performance would be helpful, Kaiser Chemicals will be glad to work with you. Installation service at no extra cost. Standard brick sizes available, both burned and chemically bonded. Complete facilities insure superior service. Call or write principal sales offices: *Chemical Division*, Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California. First National Tower, Akron 8, Ohio.

Kaiser Chemicals

Pioneers in Modern Basic Refractories

Basic Refractory Bricks and Ramming Materials • Dolomite • Magnesia • Magnesite • Alumina • Periclase



what tough rock like this *used to do* to a shovel?

If you've ever dug rock, you know what it can do to a shovel. But now, there's no excuse for the shocks and impacts of hard rock digging to wear out or break up a shovel before its time. Back in 1940, Thew-Lorain ended all that with the introduction of the Hydraulic (fluid drive) Coupling on the big 2-yd. Lorain-820. Today, it's still the best way to absorb digging shocks and strains—far more effective than any make-and-break mechanical gadget. Shocks and stresses "melt" away before any damage can be done to mechanism or cables. What's more, you can't stall a Lorain-820 engine, either, under any digging circumstances.

The Lorain Hydraulic Coupling is only *one* big feature that makes the Lorain-820 different and better than any other machine in the 2-yd. class . . . you get this feature as standard equipment. If rock digging is "shocking" to your equipment and costs, ask your nearby Thew-Lorain Distributor to tell you the Lorain-820 story — and show you proof on the job.

THE THEW SHOVEL CO., LORAIN, OHIO

LORAIN 820

Hydraulic Coupling Is Standard

Demand this feature in your next 2-yd. shovel-crane. Whether your machine must take the "shock of rock" or work on the easiest material handling jobs, you'll get s-m-o-o-t-h-e-r, money-saving performance with the Lorain Hydraulic Coupling. Lorain-820's are available on crawler and rubber-tire mountings.

820

THEW LORAIN®

SHOVELS • CRANES • CLAMSHELLS • DRAGLINES • HOES

NEW UST* Continental Idlers

*** UNIT-SEALED PRE-LUBRICATED TIMKEN BEARINGS**

Saves Grease!
Saves Labor!
Saves Belts!

CGC UNIT-SEALED
CGC PRE-LUBRICATED
CGC TIMKEN BEARINGS

STANDARD DUTY IDLER

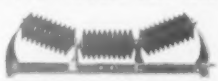
Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life.

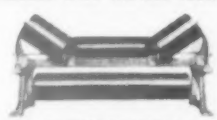
Most important—this construction permits operating the Continental "UST" Idler without relubrication for 1-2-3 years depending upon the severity or character of conditions.

Write for Bulletin R.P.-116

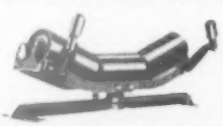
SELF-ALIGNING FLAT BELT IDLER



RUBBER DISC IMPACT IDLER



GRAIN CONCENTRATION IDLER



SELF-ALIGNING TROUGHING IDLER

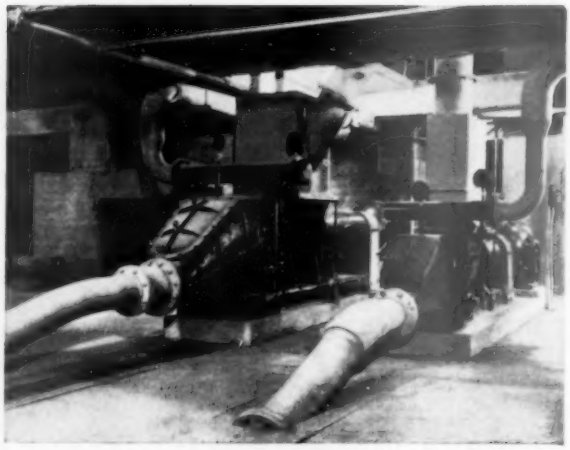
Long Life- THE ULTIMATE IN MINIMUM MAINTENANCE

CG—5209

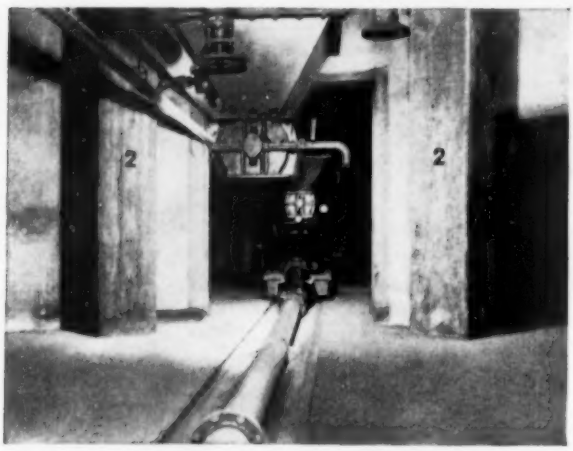
INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

Fuller-Kinyon 9-inch Type H Pump (left) conveys 80 tons of dry, raw materials an hour, a distance of 592 feet; the 8-inch Type H Pump conveys dry, pulverized material a distance of 502 feet from mills to silos.



Fuller-Kinyon 7-inch Type H Portable Pump conveys 400 bbl. of finished cement a distance of 398 feet from silos to packer bins.



DRY, FINE MATERIALS PUMPED LIKE A FLUID

with the

FULLER-KINYON
CONVEYING SYSTEM

Typical Materials Conveyed By Fuller-Kinyon Systems

Asphalt filler dust
Barytes
Bauxite
Catalysts
Cement (Portland)
Cement raw Materials
Chalk
Clays (dried)
Coal (pulverized)
Coke dust
Dolomite (pulverized)
Feldspar
Flue dust
Fly ash
Fuller's earth
Gypsum (calcined)
Gypsum (raw)
Lime
Limestone (pulverized)
Magnesite
Manganese dioxide
Ores (pulverized)
Phosphate rock (pulverized)
Rock dust
Soda ash
Starch

Large quantities of dry, pulverized materials—aerated to the point of fluidity—can be pumped quickly to storage bins and silos, packer bins, bulk-loading stations and between processing points, *just like any fluid.*

The Fuller-Kinyon Conveying System has the advantage of stable operation under varying loads, and offers a wide range of capacities to choose from. The System's network of air-tight ducts allows materials to flow horizontally, vertically, and around corners . . . an economical arrangement for process plants with limited space in which to install pulverized material-conveying equipment.

If your present bulk handling system does not have these advantages—ask a Fuller engineer to survey your set-up. There's no obligation on your part, with a wealth of new facts to be gained on economical conveying.

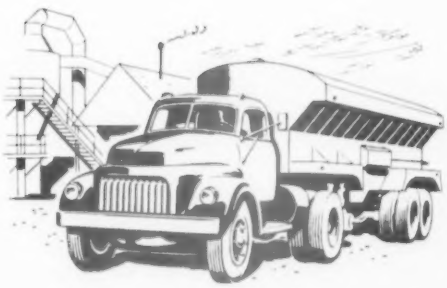
Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY
Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

P-135

Eaton 2-Speed Truck Axles



More than a Million-and-a-Half in Trucks Today!

combine both pulling power and speed with low operating cost

Pulling out under full load, climbing grades, snaking through traffic, making time on the open highway—the right gear ratio available for every situation means quicker trips, more pay-load miles at lower cost, more miles in the life of the truck. Ask your dealer to explain why trucks with Eaton 2-Speed Axles do more work for less money.

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

First of a Series of Dynamatic Kiln-Drive Applications

Dynamatic eddy current rotating apparatus has been used for many years in a wide range of industries for better speed control, quality control, and minimum operating costs.

The Dynamatic installation at the new Penn-Dixie Cement Plant at Kingsport, Tennessee, is the first of a number of recent kiln installations for the production of lime, phosphate, and cement.

In the Penn-Dixie installation, a Dynamatic model 10W liquid cooled coupling driven from a 350 H.P., 514 R.P.M. synchronous motor, drives the induced draft fan to handle all the air through the kiln. A model 8W liquid cooled coupling is used for the main kiln drive and is driven by a 200 H.P., 1200 R.P.M. cage motor. Small Dynamatic air cooled couplings are used on the synchronized slurry feed drive, the cooler drive, and the coal feeder drive.

The large liquid cooled couplings and all auxiliary drives are simultaneously controlled by heavy duty dust-tight industrial electronic controls arranged with automatic transfer switches to insure continuous operation.

Send for your copy of Bulletin GB-1, which illustrates and describes these and other applications.

DYNAMATIC® CORPORATION • KENOSHA WISCONSIN

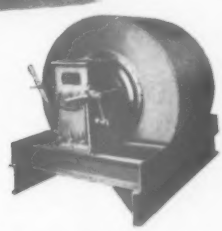
Subsidiary of **EATON MANUFACTURING COMPANY**, Cleveland, Ohio

Dynamometers • Oil Well Drawworks Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
Ajusto-Spedes • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls

You Can Cut Today's High Production Costs with STURTEVANT EQUIPMENT

AIR SEPARATOR

For separation of fines to 325 mesh and finer. Increases output from 25% to 300% . . . lowers power costs by 50%. For years, this separator has been the standard in the cement industry.

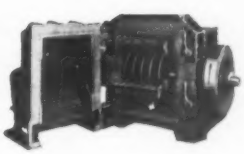


DUSTLESS BLENDER

Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ¼ ton per hour and up.

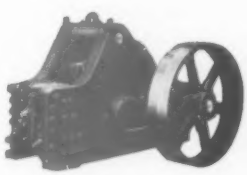
RING-ROLL MILLS

For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open-door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



SWING-SLEDGE MILLS

For coarse and medium reduction (1" to 20 mesh). Open-door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.



JAW CRUSHERS

For coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

Sturtevant equipment, such as illustrated, helps you overcome high labor and production costs by increasing output. In addition, their rugged construction assures long life with minimum maintenance. It will pay you to investigate these machines. Write for information.

STURTEVANT MILL COMPANY

104 CLAYTON STREET, BOSTON 22, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

MAIL COUPON TODAY!

STURTEVANT MILL COMPANY
102 Clayton Street, Boston 22, Mass.

Gentlemen:
Please send me your catalog. I am especially interested in _____

Name _____

Street _____

City & State _____

Your Management wants to know...

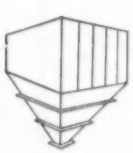
How valuable dust recovery automatically boosts production

Nineteen years ago, our engineers developed what we think is the most workable way of solving the Dust Recovery problem. It was the formation of "dust recovery teams", consisting of Buell engineers and the plant engineer—the man who knows his particular dust problem better than anyone else.

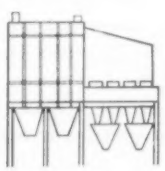
This team, drawing on the experience and background of Buell, coupled with the plant engineers' intimate knowledge of his own problem, brought about the kind of results industry has been seeking: substantial profit increase, improved product and/or process, better employee morale.

To learn more about Buell's **3 basic systems** of Dust Collection, Buell's Plant-Engineer-Team-Up, and how they can work for you—send for the new informative booklet entitled, "The Collection and Recovery of Industrial Dusts". Buell Engineering Co., Dept. 17-F, 70 Pine Street, New York 5, N. Y.

VAN TONGEREN CYCLONE

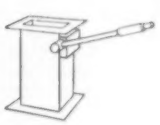


'SF' ELECTRIC PRECIPITATOR



PRECIPITATOR—CYCLONE COMBINATION

TYPE 'LR' COLLECTOR

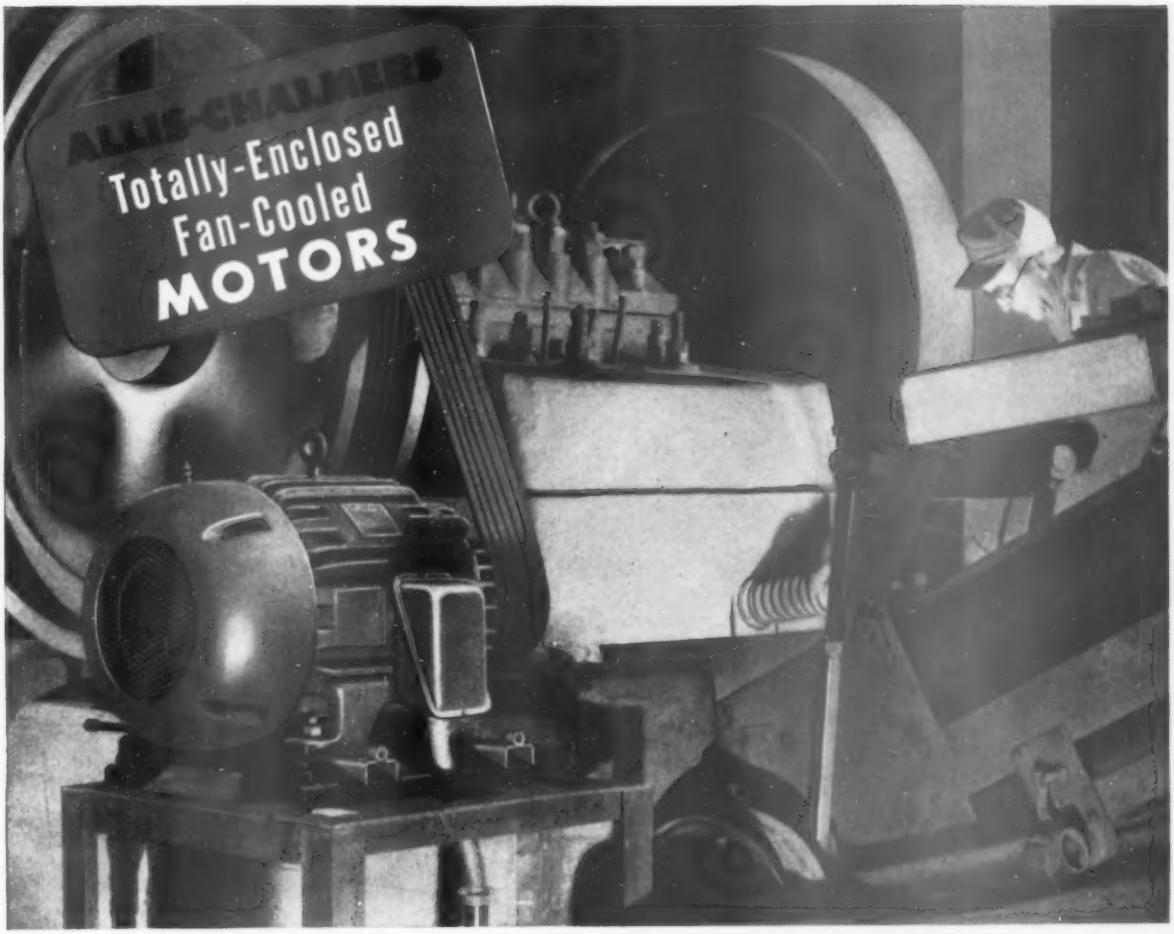


DUST HOPPER VALVES

ELECTRIC CYCLONIC

buell®

ENGINEERED EFFICIENCY IN DUST RECOVERY



Get These 3 Low Maintenance Features

1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

3 Pre-lubricated Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

GET COMPLETE INFORMATION on Allis-Chalmers motors for indoor and outdoor service — complete with Allis-Chalmers coordinated control — from your nearby A-C Authorized Distributor or District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

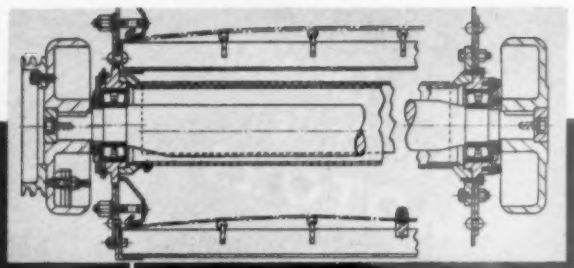
TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

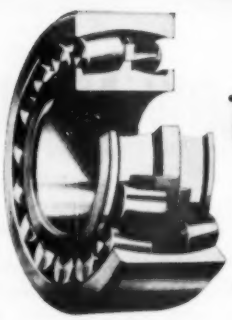
ALLIS-CHALMERS

A-4038

The centrifugal force which produces the perfect circle motion of Ripl-Flo Heavy Duty Vibrating Screens, manufactured by Allis-Chalmers, is imparted through precision-ground, self-aligning TORRINGTON Spherical Roller Bearings.



Solving toughest bearing problems!



Tough bearing problems are encountered in the design of heavy-duty vibrating screens. Leading builders have found the answer in TORRINGTON Spherical Roller Bearings.

Self-aligning, these rugged TORRINGTON Bearings compensate for minimum shaft deflection. Bearing capacity remains constantly at peak value. Bearing wear is greatly reduced.

Precision-ground from heat-treated high-alloy steels, TORRINGTON Spherical Roller Bearings cut friction to a practical minimum. Power flows smoothly and efficiently on high conformity surfaces. Bearing life is lengthened and daily tonnages climb.

Features like these solve the toughest bearing problems not only in vibrating screens but also in pulverizers, grinding mills, crushers and rotary kilns.

Always use TORRINGTON Spherical Roller Bearings!

THE TORRINGTON COMPANY
South Bend 21, Ind. Torrington, Conn.

TORRINGTON SPHERICAL ROLLER BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

"Plain Primacord will hug the Plastic in a tight double hitch...

"I use Plastic Reinforced Primacord for unusual wet conditions, and in deep holes, or wherever field shots must stand a long time before blasting. It has a tough, plastic cover and will take a lot of punishment. It is not affected by high summer heat or winter cold.

"I use a trunk line of flexible Plain Primacord and make a double half hitch around the Plastic Reinforced branch line at a right angle, like this. The textile covered Plain Primacord grips securely in a tight double loop around the plastic cover without slipping.

"Tight right-angle Primacord connections all along the line go a long way toward giving you a good shot every time."

Ask your explosives supplier or write for further facts to

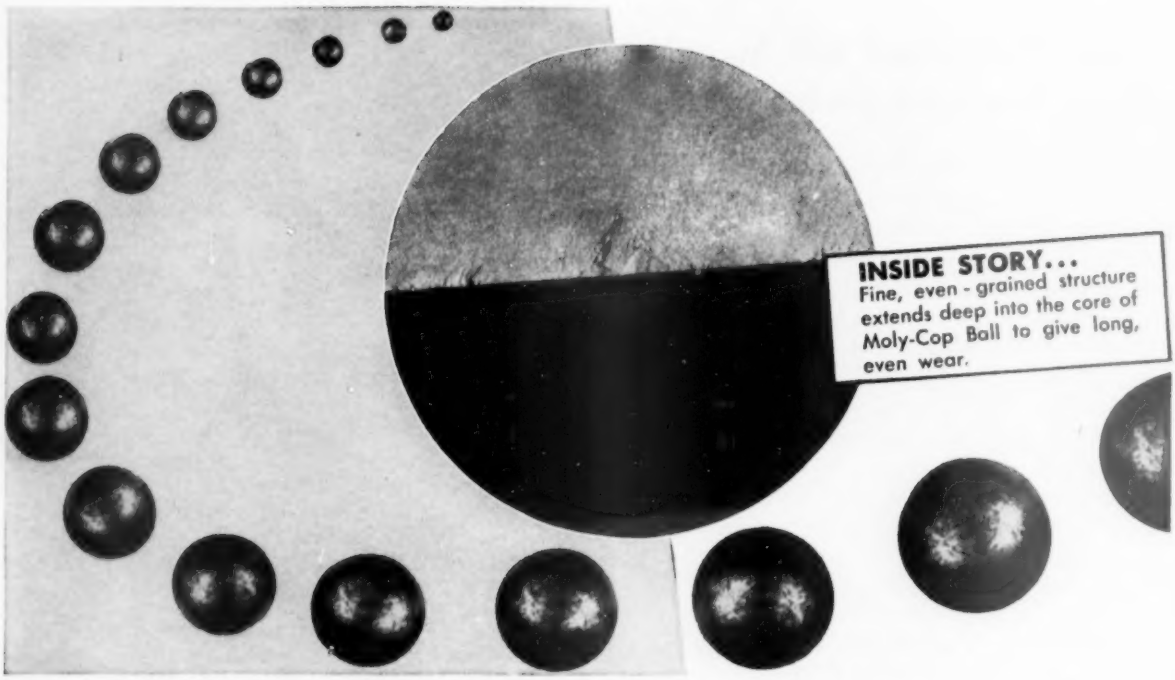
THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Safety Fuse Since 1836

Here **Plastic Reinforced Primacord** is used for the branch line, and **Plain Primacord** for the trunk line. Note the double half hitch around the plastic cover. It pulls up tight and stays that way.

Other brands to serve your needs are: **Reinforced Primacord,** for deep holes and resistance to abrasion; and **Wire Countered Primacord,** for deep, ragged holes.

P-3

Use PRIMACORD
The PROVED and APPROVED DETONATING FUSE



If you want a finer grind . . . use a finer ball!

SHEFFIELD MOLY-COP

TRADEMARK REG.

COPPER-MOLYBDENUM-ALLOY

Grinding Balls

For fine grinding you want a ball that will give you the highest possible production rate with the lowest cost per ton of material ground . . . fewer chargings, less "down time."

Sheffield Moly-Cop Balls meet that requirement — because Sheffield's exclusive alloy and automatically controlled manufacturing methods produce a ball of finer, denser, more uniform structure. You get toughness and greatest resistance to abrasion. Moly-Cop Balls wear evenly, retain their spherical shape longer.

Tests have proved that Moly-Cop Balls wear up to 35% longer than alloy cast steel balls; up to 50% longer than best quality unalloyed carbon forged steel; and up to 120% longer than cast white iron balls. Considering initial costs and length of service, the net savings that result from the use of Moly-Cop Balls are substantial.

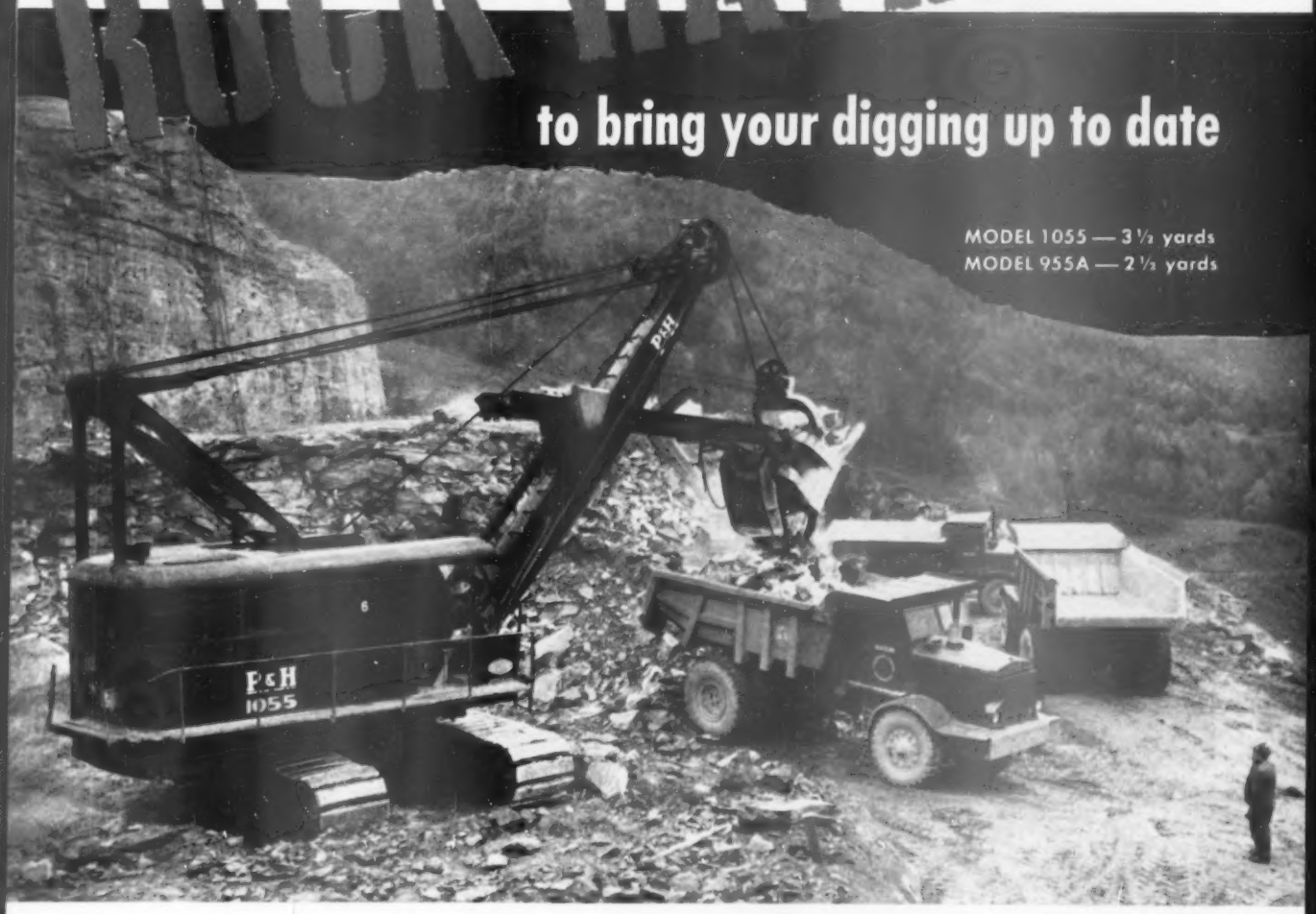
Used and proved around the world—*Sheffield engineers* are ready to prove the money-saving advantages of Moly-Cop Grinding Balls in your operation. Get in touch with us now.

SHEFFIELD
STEEL
CORPORATION
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

Export Representatives: **ARMCO INTERNATIONAL CORPORATION, MIDDLETOWN, OHIO**

ROCK RATED

to bring your digging up to date



You have the jump on costs when your new P&H takes over the tough digging jobs. Why? Because there's no other machine to match its performance. You have the speed — a 15% to 25% faster digging cycle — for bigger production. You have the all-welded strength to take shock loads that would K.O. less rugged machines. You have the stability to exert more power at the tooth point. That gives you added capacity.

If you're ready to cut your costs, these P&H's are ready to help you.

P&H MAGNETORQUE*
ELECTRIC SWING

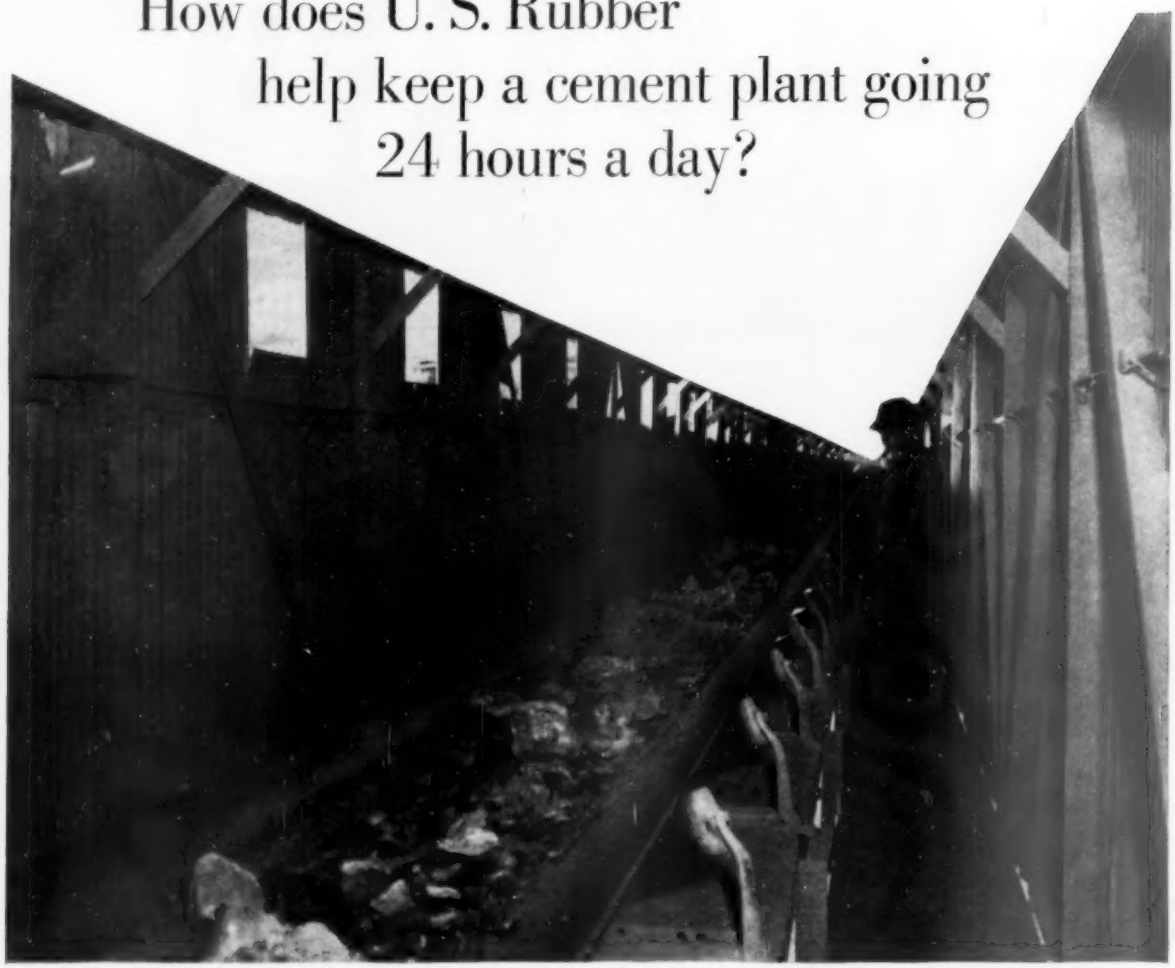
the greatest shovel improvement in 20 years. It's smoother, faster, more dependable. It eliminates the old swing frictions with their constant headaches and replacement costs. Magnetorque lasts the life of your machine. You should know the facts about it!

**T.M. of Harnischfeger Corporation for electro-magnetic type coupling.*

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the P&H Line

How does U. S. Rubber help keep a cement plant going 24 hours a day?



U. S. Rubber engineer inspecting belt. Inspection is a part of U. S. Rubber's continuous-servicing policy. View is looking down gallery to primary crusher.

(left) Overall view of cement plant, showing belt galleries connecting primary crusher plant (at right) with transfer house and mill.

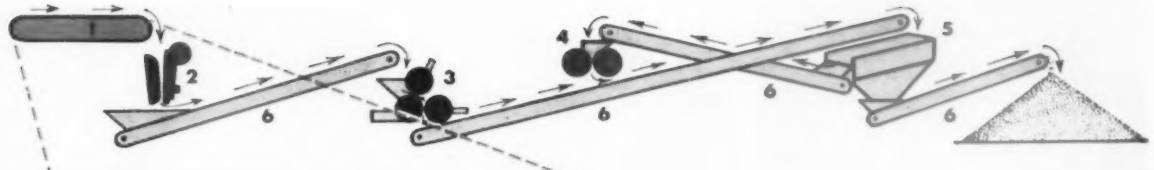
U.S. Rubber conveyor belts are the lifeline of the plant. They help maintain the uninterrupted operation that is essential for the plant's economical production. These belts, as they carry the limestone from the pit to the kilns, withstand the abrasive action of the limestone all around the clock, seven days a week, handling 600 tons per hour.

"U.S." has always been a leader in materials handling. It will pay you to consult "U.S." engineers when you have a problem. Write to address below.

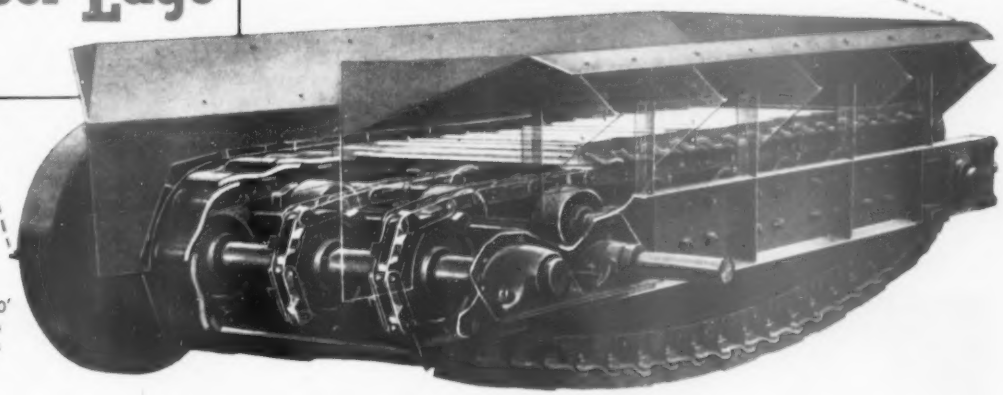
PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.



Increasing Plant Output with the Pioneer Edge



PIONEER 36" x 10' Apron Feeder with Flared Sideboards

Control the feed...Increase production!

WANT to squeeze every possible ton of material through your plant that it's able to handle?

Then consider the Pioneer Apron Feeder, and how it takes over the job of keeping the primary crusher going at top capacity by feeding a continuous, even flow of material at all times. No surges to choke the crusher . . . no voids to make it run empty.

Here again is the famous PIONEER EDGE in action, for these rugged Feeders are built to take the heaviest impact, the heaviest dump loads from the quarry or mine. Available with straight, flared, or no sideboards, and with a type of drive to fit any installation.

FEATURES

1. ½" thick forged steel pans, rigidly supported by rollers, take heaviest shock loads. *No thicker pans available on any comparable feeder.*

2. Pans are overlapped to give extra strength and rigidity. Provide corrugated surface which reduces slippage.

3. Sideboard wear plates are easy to change.

4. Quick-acting clutch or push button operation gives precise control of flow.

SPECIFICATIONS
PIONEER APRON FEEDERS

Width of Feeder	Capacity in tph at specified ft. per minute				Approx. wt.* with flared sideboards
	15'	20'	25'	30'	
30"	112	148	186	226	7140
36"	162	216	270	310	7895
42"	222	294	369	444	8490
48"	289	386	482	575	9225

*10 foot length, built-in speed reduction for use with crusher.

BUY BOTH! HIGHER OUTPUT LOWER UPKEEP

Pioneer *Continuflo* EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.
Subsidiary of Poor & Company • Chicago
Please send information on equipment checked.

- ☐ GRAVEL PLANTS
- ☐ ROCK PLANTS
- ☐ JAW CRUSHERS
- ☐ ROLL CRUSHERS
- ☐ WASHING PLANTS
- ☐ BITUMINOUS PLANTS
- ☐ APRON FEEDERS
- ☐ ORE FEEDERS
- ☐ MECHANICAL FEEDERS
- ☐ VIBRATING SCREENS
- ☐ BUZZER SCREENS (LIGHT DUTY)
- ☐ CONTINUFLO CONVEYORS

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

Substantial savings are realized by cement mill operators using ABK Metal liners in primary, secondary or tertiary compartments for wet or dry grinding of raw stone or finished product.

Extended liner life of as high as 3 or 4 times can be expected when ABK Metal replaces ordinary iron liners. That's because of the extreme hardness (500 to 700 Brinell, as required) and very high resistance to abrasion that is characteristic of every ABK Metal casting. A nickel-chrome iron of controlled structure, ABK Metal is produced only by Brake Shoe.

Why let abrasion steal your operating dollars. Specify ABK Metal castings . . . cut your replacement, maintenance and downtime costs and increase your grinding mills' efficiency.

QUALITY CASTINGS IN | **DUCTALLOY** | **MEEHANITE** | **ABK METAL**

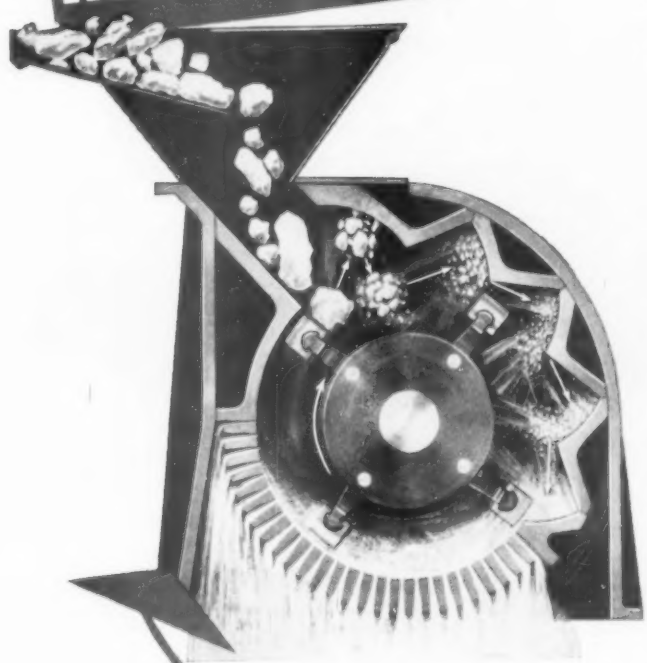
1607

AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION
230 Park Avenue, New York 17, N. Y.

These Five *Pulverator* Features Help REDUCE AGLIME COSTS

PULVERATOR Hammermills



1. SQUARE HIT

A square hit is the most powerful breaking blow. *Pulverator* hammermills are designed to utilize this important principle of impact crushing. Feed is hit squarely by flat hammers.

2. MULTI-IMPACT

Hammers break and repeatedly smash the material squarely against involute breakers—resulting in a minimum of wear on breaker plates. *Pulverators* may be operated with or without grate bars and at various speeds.

3. HIGH PRODUCTION

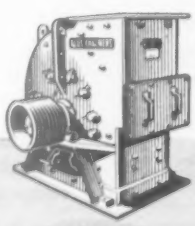
The multi-impact principle produces more fines ahead of the grate bar section. With more fines passing the grate, you get high production at lower cost. Also — power requirement and maintenance are reduced.

4. QUALITY PRODUCT

Pulverator hammermills break material into a uniformly distributed cubical product. The product analysis can be varied by changing grate bar spacing and operating speed.

5. RENEWABLE PARTS

Liners, breaker plates, hammers, hammer arms and individual grate bars can be replaced separately. Hammers and grate bars are reversible.



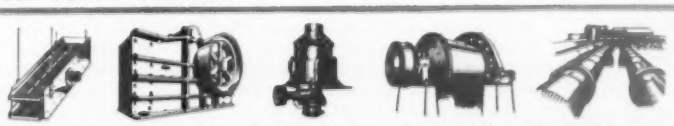
Pulverator hammermills are built in five sizes, capacities 2½ to 160 tph. Get more facts from the A-C representative in your area, or write for *Pulverator* Bulletin 07B6265A, Allis-Chalmers, Milwaukee 1, Wis.

A-4032

ALLIS-CHALMERS

Pulverator is an Allis-Chalmers trademark.

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.



Vibrating Screens | Jaw Crushers | Gyratory Crushers | Grinding Mills | Kilns, Coolers, Dryers

SWEATING OVER A

Hot Material*

HANDLING PROBLEM?

Here Are 7 Good Reasons Why Rex Pan Conveyors Can Solve It For You When Cooling En Route Is Desired

1. Conveyor designed so that ratio of mass of dead load (pans, etc.) and live load is correct for efficient heat transfer. Maximum initial temperatures are thus easily handled. Localization of intense heat can be controlled.
2. Shape of pans provides maximum surface area for efficient cooling and is suitable for carrying up inclines up to 25°.
3. Chain and carrying rollers removed from intense heat zone.
4. Wear largely confined to heavy, carrying outboard rollers on sleeve-type bushings made of hard, long-wearing, heat-treated white iron.
5. Unique outboard roller construction permits easy servicing without disassembling chain or conveyor. Simple graphite lubrication.
6. Low power requirements because of large diameter carrying rollers.
7. Through rods at joints for increased rigidity and much longer chain life.

* **Calcined, Sintered, Briquetted, Nodulized, etc., over 300° F.**

Investigate the ways that Rex Apron and Pan Conveyors can help solve your hot material handling problems today. Call your nearest Rex Field Sales Engineer or write for complete details. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT REX COMPANY ®

Chain Belt COMPANY OF MILWAUKEE

Atlanta • Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • El Paso • Houston • Indianapolis • Jacksonville Kansas City • Los Angeles • Louisville • Midland, Texas • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Portland, Oregon • Springfield, Mass. • St. Louis • Salt Lake City • San Francisco • Seattle • Tulsa • Worcester

Distributors located in principal cities in the United States and throughout the world
EXPORT OFFICES: Milwaukee and 19 Rector Street, New York City

Can your rear-dumps match these performance records?

NEW YORK CEMENT PLANT
travels 1 mile in 3½ minutes

Lehigh Portland Cement Co., Albany, uses this D Tournarocker to haul waste. Unit loads 12 yds., makes 1 mi. trip to dump in 3½ min. With front-wheel drive, Tournarocker backs safely to edge, dumps clear over bank. Rear-drives can't work near unstable dump edge, need expensive clean-up.

3,000,000-YD. PA. MINE JOB
dumps ½ min. faster than trucks

J. Robert Bazley Inc., Pottsville, Pennsylvania, strips overburden at their Mt. Carmel coal mine with 3 C Tournarockers. On 2100' haul, each "C" removes 15 bank yds. of sand, clay and rock every 7.4 minutes. With electric dump, fast spotting "C's" unload ½ minute faster than trucks.

200,000-YD. W. VA. TUNNEL JOB
turns where trucks can't

Bates & Rogers Construction Corp., Chicago, teamed 2 D Tournarockers and 2 trucks to haul muck and shale for B. & O. railroad tunnel near Clarksburg. While trucks needed skid plate to turn inside 31' wide tunnel, "D's" made 90° turns (in 12'4" radius) and easily maneuvered under shovel.

245,000-YD. N. H. HIGHWAY
392 yds. in 7 hrs. on 3-mi. cycle

Frank W. Whitcomb Construction Corp., North Walpole, used 2 C Tournarockers on relocation of Rt. 103 near Newbury. These rigs moved 392 pay yds. of rock per 7-hr. day over 3-mile cycles. Each 186 h.p. "C" hauled 10 pay yds. per load . . . completed a cycle every 18 minutes despite heavy traffic.

140,000-YD. VIRGINIA HIGHWAY
interchanges rear-dumps, scrapers

Robertson, Bolen & Fowler, Buchanan, W. Va., interchange rear-dumps, scrapers behind their 122 h.p. "D" prime-movers. On U.S. 11 near Lexington, 2 "D's" with rear-dumps spotted quickly at cramped roadside cut where trucks couldn't position without jockeying. Typical 2000' cycle took "D's" 5½ minutes.

Tournarocker—Trademark Reg. U. S. Pat. Off. R-232-JS-bw

For 24 years the leader in rubber-tired dirtmoving

R. G. LeTOURNEAU, INC.
PEORIA, ILLINOIS

LETOURNEAU LET EQUIPMENT

THE ONLY MODERN FRONT END ... ON QUARRY SHOVELS

110-B, 4½ cu. yd.
150-B, 6 cu. yd.
190-B, 8 cu. yd.

Convertible Shovels — Draglines

THE new Bucyrus-Erie Ward Leonard electric shovels bring to quarry loading the first important departure from the old-fashioned shovel front end. This advanced design — with two-section boom, inside tubular handle, and quiet positive rope crowd — increases speed and payload. It reduces upper boom weight, puts extra strength in the lower section where maximum strength is needed. It cuts out old-style handle racking and crowd pinions, takes the deadweight of crowd machinery off the boom. And, most important to *you*, it gives you all these field-proven performance advantages:

- **Lighter Weight, Greater Strength** — Two-section boom, with light upper section . . . lower section strut-connected to the A-frame.
- **No Handle Twist** — Inside tubular dipper handle is free to rotate in rubber-cushioned saddle block.
- **No Handle Binding in Saddle Block** — Rope crowd is quiet, positive, eliminates handle racking and crowd pinions.
- **No Dipper Wobble** — Twin dual hoist ropes put hoist power where needed for steady travel of dipper through bank.
- **No Sway Braces** — Widespread boom feet eliminate accessory boom braces or cables.
- **Low Swing Loads** — Advanced front end design, with crowd machinery on deck, cuts dead load on swing, steps up swing speed.
- **High Pay Loads** — Single tubular handle — with improved dipper back connections, dipper trip on saddle block, no dipper bail — reduces dead load on hoist, leaves more power for digging. 311.53C

There's much more to the story, too. Deck machinery, electrical equipment, and mounting all match the front end in advanced engineering and outstanding performance advantages. The full story will convince you that yard for yard, dollar for dollar, pound for pound, these are the finest rock excavators ever built.

Write for Complete Information Today!

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY SOUTH MILWAUKEE, WISCONSIN

4 Powerful Reasons why costs go down with CHEVROLET ADVANCE-DESIGN TRUCKS on the job

EXTRA POWER WITH ECONOMY! More hauling power, greater economy! That's the result of new 7.1 to 1 compression ratio of improved Loadmaster engine on 5000 and 6000 Series heavy-duty and forward control models—optional on 4000 Series heavy-duty trucks. Thriftmaster engine in light- and medium-duty models provides traditional Chevrolet economy.

ENGINEERED FOR THE JOB! With Chevrolet, you buy a truck that is exactly right for the job. Not too big. Not too small. You get a truck engineered from the ground up with your job in mind—with the right tires, springs, axle, clutch and engine. You get a truck that will stick on the job day after day, and do your work at lowest cost.

BUILT TO LAST! The extra-sturdy construction of Chevrolet advance-design trucks means longer life, even lower costs. Now, Chevrolet trucks are brawnier than before—with heavier, more rigid frames, with greater ruggedness and stamina built right in. These are the toughest and the sturdiest Chevrolets ever.

THE LINE LISTS FOR LESS, TOO! With all the solid superiorities that Chevrolet offers—with all their special features and advantages—this great line of haulers lists for less than any other trucks of comparable size and specifications. See your Chevrolet dealer. Chevrolet Division of General Motors, Detroit 2, Michigan.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTIPANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

CHEVROLET

first in demand in value in sales

"let's knock off, boys...

these are SUPER-TEMPERED PRECISION SPACE SCREENS"

Yes, these three trouble-makers know when they've had enough. They know that when Super-Tempered Precision Screens go on the job, it's time for them to hit the road.

Abrasion... Vibration... Fatigue—these are destructive forces that can upset your production schedules, cost you plenty in more downtime and more frequent screen replacement. But—not when you install Super-Tempered Precision Space Screens. And here are two good reasons why:

First: They stay tight because they're precision crimped and woven extra tightly on powerful hydraulic looms.

Second: They resist abrasion and fatigue because they're made of hard and tough super-tempered steel.

To order, write or phone our nearest sales office.

THE COLORADO FUEL AND IRON CORPORATION—Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION—Oakland, California
WICKWIRE SPENCER STEEL DIVISION—Atlanta, Boston, Buffalo, Chicago
Detroit, New York, Philadelphia

SUPER-TEMPERED
PRECISION SPACE SCREENS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION
CF&I

1187

THREE MARION 93-M SHOVELS

Harvest "Rock Cotton" in Canada

Three MARION 93-M Diesel shovels working in asbestos pits of the Canadian Johns-Manville Company, Ltd., in northern Ontario get a real workout.

They are on around-the-clock schedules in land where the mercury can drop to 60 below. The digging is all solid rock.

Two of these diesel shovels load out waste rock on both sides of the fiber-laden serpentine rock which the third machine digs. Despite the rigors of weather and terrain, each MARION turns in impressive tonnage records.

The details about 93-M strength, power and stamina to handle big assignments may point the way to a happy solution of some excavating problem for you. Why not ask your nearest MARION representative today about 93-M Diesel and Ward-Leonard electric machines?

MARION **POWER SHOVEL CO.**
MARION, OHIO, U. S. A.

from 3/4 cu. yd. to 45 cu. yds.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

COMING UP... 200,000 TONS of Rock for Australia's HUME DAM

This sturdy Lima Type 1201 shovel with 3½-cu. yd. capacity is playing a major role in enlarging Australia's Hume Dam. It is excavating, singlehanded, from a blue granite quarry, all of the rock needed to help raise the water level of the reservoir 20 feet and to increase its storage capacity 750,000 acre-feet.

The right shovel for this rugged job certainly is being used by the Public Works Dept. of New South Wales. The Lima Type 1201 has the extra power and durability that are so necessary for rugged digging in quarries or ore mining. We invite you to investigate this machine and find out how much it can increase your output and lower your costs. You'll like its friction-free operation through the liberal use of anti-friction bearings . . . and its air controls that make operating it such a pleasure.

There's a Lima for every job . . . shovels from ¾ to 6 cu. yds., cranes up to 110 tons, and draglines variable. Write us for our recommendation of the right machine to fit your needs.

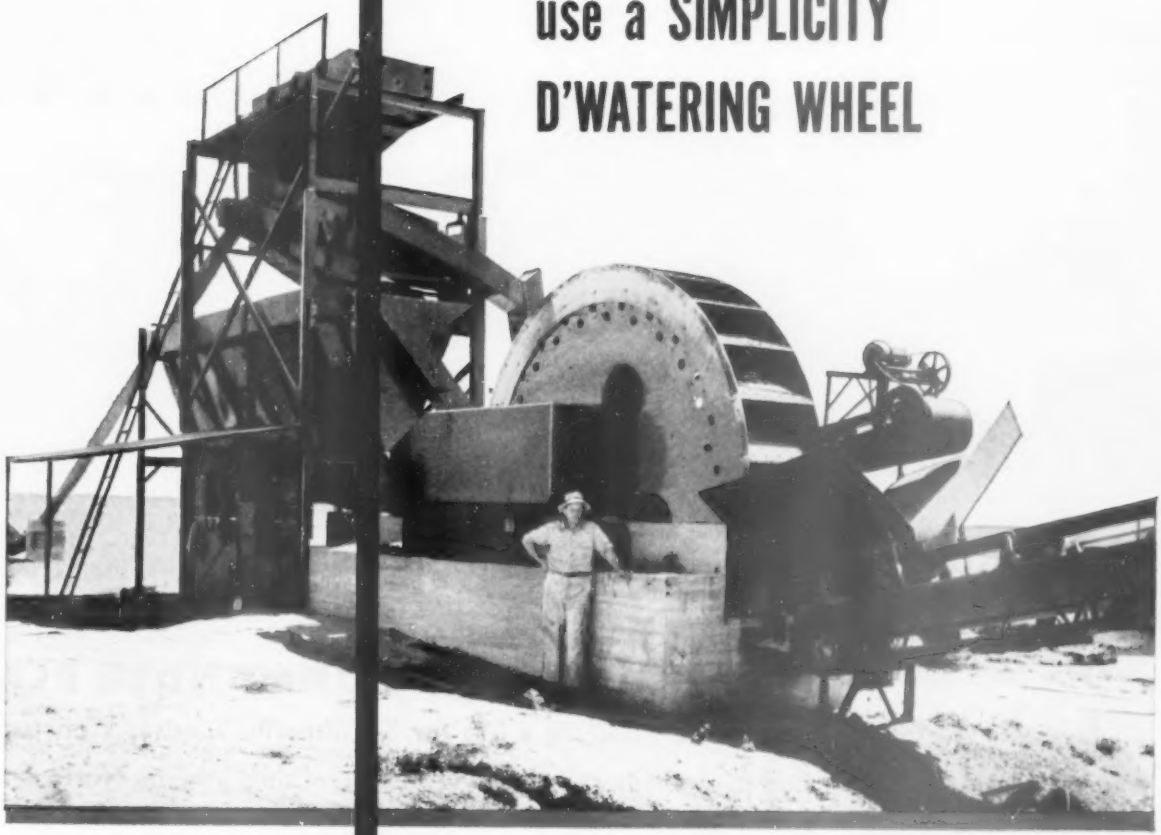
LIMA DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

There's no cheaper method of dewatering sand or gravel . . . use a SIMPLICITY D'WATERING WHEEL



In the installation shown here, a Simplicity D'Watering Wheel is teamed up with a Double Deck Simplicity Gyrating Screen to provide fast, low-cost sizing, separating and dewatering of sand and gravel. The screen separates the gravel from the sand and deposits sand in the tank of the D'Watering Wheel. Then the Wheel lifts the sand from the tank, reducing the moisture content to 12% in the process, and delivers it to a fast-moving inclined conveyor belt. One simple power unit is all that is necessary. Maintenance and operating costs are virtually eliminated, thus making the Simplicity D'Watering Wheel more economical than any other device for dewatering sand and gravel. Simplicity D'Watering Wheels are available in 2' and 3' widths with 14' diameters. For more information about this economical equipment, consult a Simplicity sales engineer or write us today.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario

FOR EXPORT: Brown & Sites, 50 Church Street, New York 7, N.Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

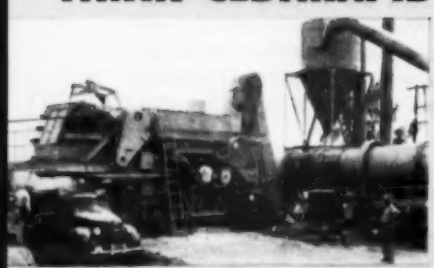
THINK BIG... to meet THINK

ANOTHER Cedarapids PRODUCT

THIS CEDARAPIDS COMMANDER PLANT

is doing a whale of a job for Schultz and Lindsay Construction Company on tough crushing and screening jobs in North Dakota. It's no wonder they're enthusiastic about Commander performance. They say they especially like the design ratio of the jaw and roll crushers, screen and conveyors. They also like the high screening capacity and the extreme portability of this compact unit.

THINK CEDARAPIDS . . *when you think of bituminous mixing*

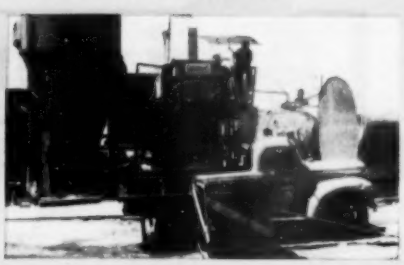


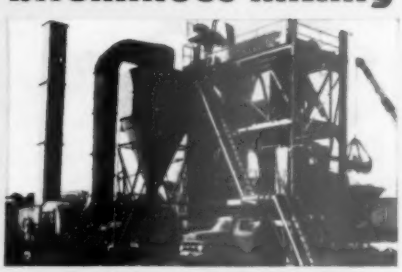
MODEL FA

The most portable batch type bituminous mixer in the Cedarapids line. The FA can be set up for operation in a matter of hours. Centralized controls insure fast, easy, one-man operation. Balanced coordination of every part produces up to 800 tons per day of accurately weighed and uniformly mixed aggregates and bitumen. Quality-built for long-term service at lowest cost.

MASTER PLANT

This two unit continuous-mix plant combines the Cedarapids Master Mixer and Gradation Control Unit to supply specification mix in big volume. The mixing unit is offered with either a twin shaft mixer which conforms to all existing specifications, or a single shaft mixer designed for high speed, vigorous mixing.





MODEL E

Two tons at a batch is average production for this Cedarapids Bituminous Mixing Plant. All-electric operation plus automatic time controls, signal lights and air controls insure absolute accuracy of mix and profitable production for low-bidding contractors.

increasing demands for aggregate

CEDARAPIDS...

FOR BIG-VOLUME PRODUCTION *LIKE THIS*—

WITH the Cedarapids Commander on your job, you can *Think Big* in terms of exceptionally high tonnage output to meet today's increasing aggregate requirements. If you are a producer who needs greater output of fine-crushed products, or if your pit conditions put a bigger load on the secondary crusher, the Cedarapids Commander is designed specifically for you!

The sizes of the crushing units, screen and conveyors are accurately balanced for maximum production. The big 30″ x 22″ Roll Crusher steps up secondary crushing capacity to produce greater quantities of smaller size aggregates. The big screening capacity of the 48″ x 10′ Horizontal Vibrating Screen accurately balances the high percentages of secondary crushing. Conveyors are 30″ wide to handle the high hourly output. *And the Commander's operating and maintenance costs remain as low as on other Cedarapids Plants!*

Talk to enthusiastic Commander owners... watch a Commander in operation... your Cedarapids distributor can tell you where there's one working near you, and give you complete details of all the reasons why you'll command the field with a Cedarapids Commander.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

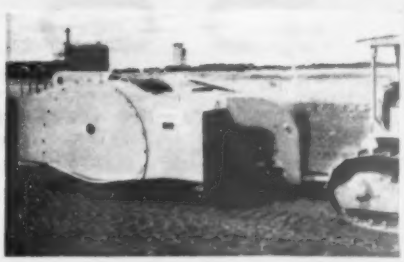
420 TONS PER HOUR
on a job crushing ⅞″ minus wet material containing 19% clay, with 15 to 20% crushing, was average production for this Cedarapids Commander Plant owned by Schultz and Lindsay Construction Company of Fargo, North Dakota.

300 TONS PER HOUR
on ¾″ material, with a heavy crush of 40 to 50%, was the Commander's production average on Schultz and Lindsay's crushing job at Garder, N. D.

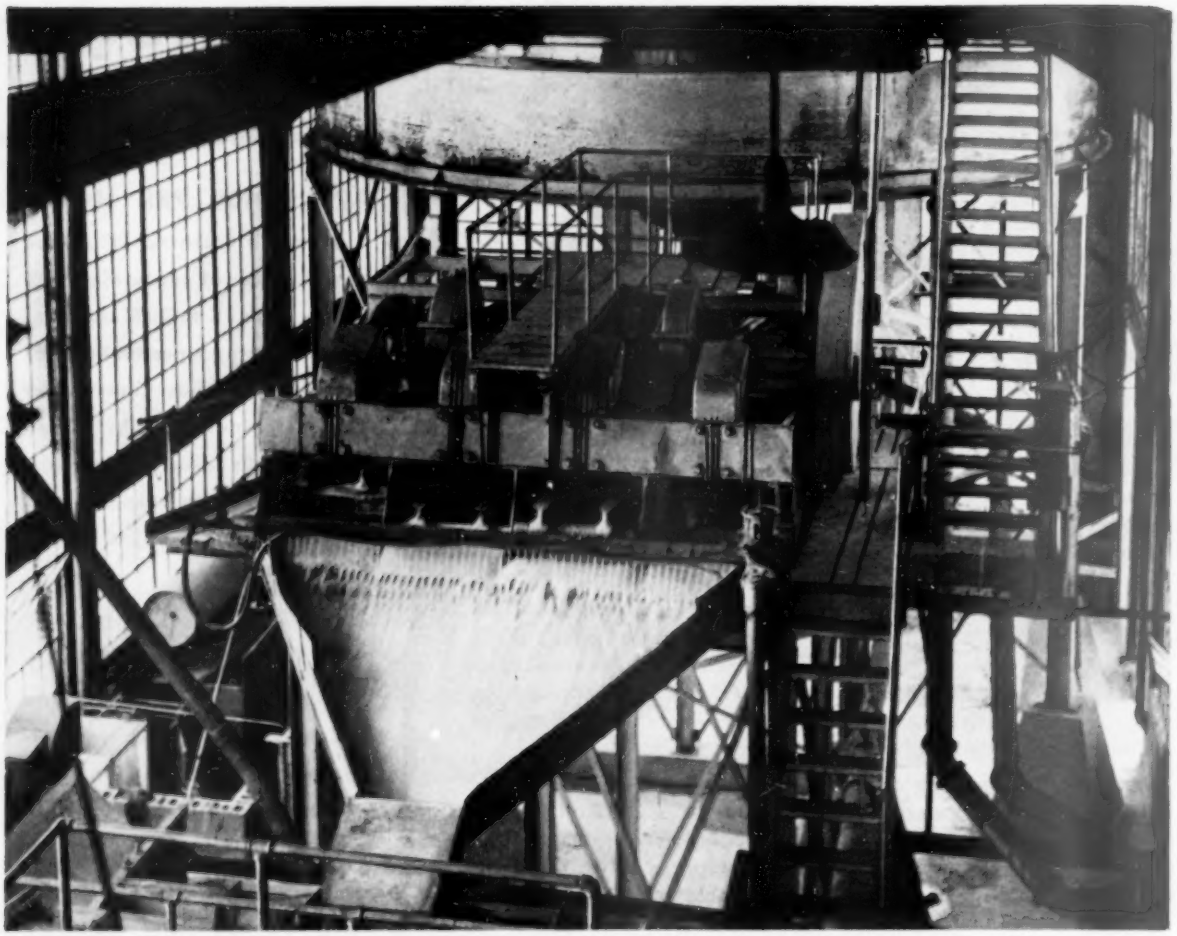
440 TONS PER HOUR!
Schultz and Lindsay's Commander Plant consistently averages this tonnage on lighter crushing jobs where all conditions are favorable.

CEDARAPIDS FEEDERS
Cedarapids Apron Type or Reciprocating Feeders control the feed, prevent choking and provide a smooth, workable flow of material to crushers, conveyors and bucket elevators, eliminating overloads and surges. Available in a wide variety of sizes for all types of aggregate or bituminous mixing plants.

VIBRATORY SOIL COMPACTORS
Here's the way to get maximum compaction on highway subgrades and bases, airport runways, or any soil and graded aggregate construction. Cedarapids Vibratory Compactors, operating on an entirely new principle, provide an impact-compacting action that reaches, and often exceeds, specified densities in one or two coverages, with less labor and lower costs.



MOTORIZED HEAD PULLEYS
Here's a money-saving departure from conventional conveyor drives. With Motorized Head Pulleys, *everything* is contained inside the drum, completely protected from grit, dirt and weather, with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime eliminated when you convert your belt conveyor or belt-bucket elevator installations to *motorized* efficiency!



A Dorr Hydroseparator and two Dorr Classifiers are used by a large Mid-Western sand producer for desliming, scrubbing, washing and dewatering. The Dorr Hydroseparator and Classifiers are operated in series to produce a high grade commercial minus 28 plus 150 mesh product.

Two additional Dorr Classifiers have recently been installed to meet increased production demands.

No Lost Sand Production *Here* . . .

Five years of continuous operation . . . no lost production for repairs . . . and hardly a penny spent for routine maintenance.

That's the story on this job. And it is typical of the sand plants, large and small, where Dorr equipment is in operation.

For equipment that will serve you year after year *without high maintenance costs*, it will pay you to get in touch with Dorr. Whatever your production requirements, there is Dorr sand plant equipment scaled to fit your individual requirements. Ask a Dorr Engineer for the facts.

Better tools TODAY to meet tomorrow's demand

DORRCO

DORR

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

***TEXROPE* Grommet V-Belts**—20 to 50% longer life than ordinary belts. Size for size, grommet belts give 1/3 more gripping power, pull heavier loads with higher safety factor.

STANDARD CAST IRON SHEAVES — Made to order from stock patterns. One to 14 grooves for A, B, C, D or E belts. One to 1000 horsepower. Split sheave or split hub.

***MAGIC-GRIP* SHEAVES** — Semi-steel casting with interchangeable, patented taper bushings. On and off in a jiffy. Cannot shake loose. Two to 12 grooves for B, C and D belts; 2 to 250 hp.

Everything in V-Belt Drives

from one reliable source!

GRIT, VIBRATION AND SHOCK LOADS make quarry operations tough on drives. Allis-Chalmers has both the engineering experience and the drive equipment to lick both the usual and unusual problems. Call your nearby Allis-Chalmers distributor or district office for help on your drive problems, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3849

Texrope and *Magic-Grip* are Allis-Chalmers trademarks.

Sold . . .

Applied . . .

Serviced . . .

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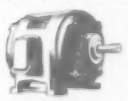


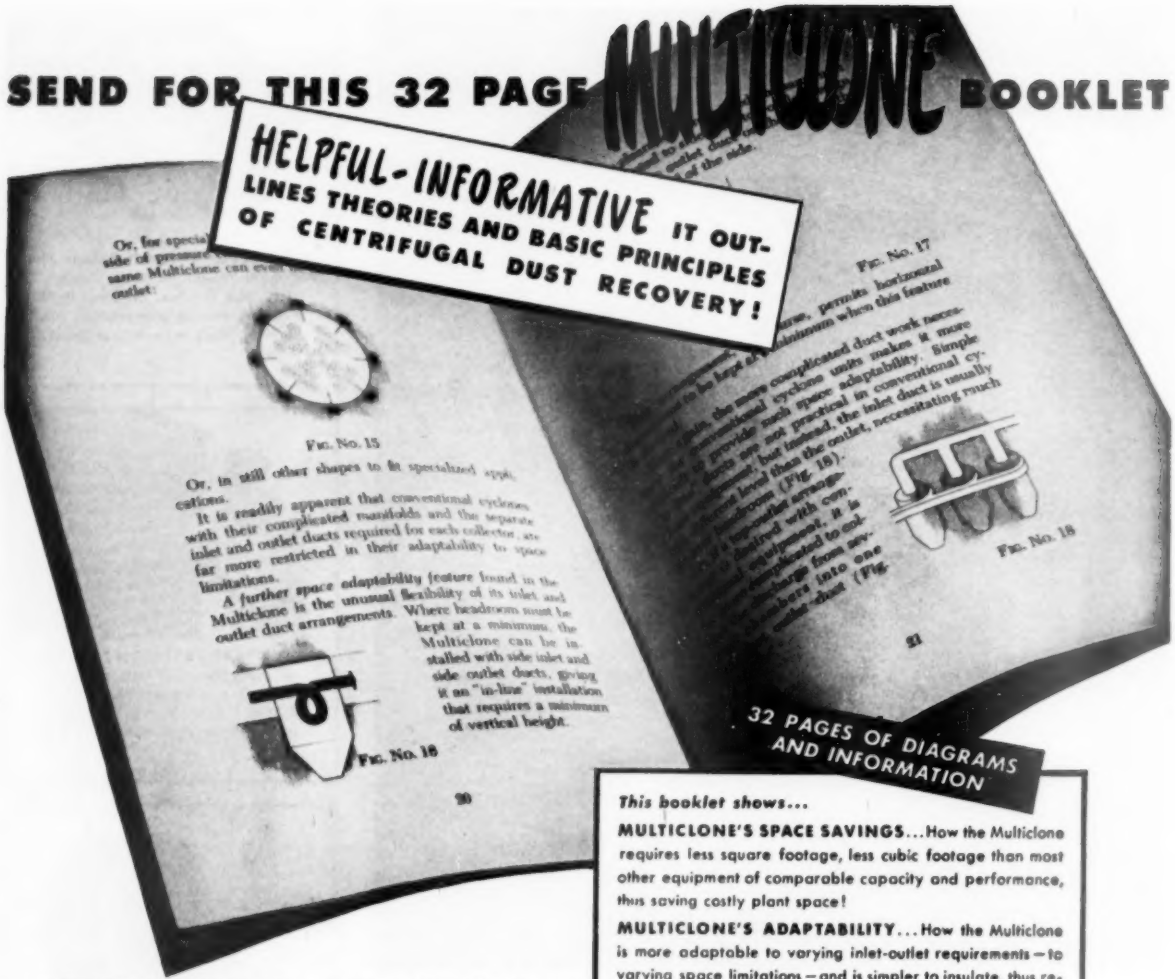
MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

SEND FOR THIS 32 PAGE MULTICLONE BOOKLET



NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different...how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS...How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY...How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY...How Multiclone's multiple *small diameter* tubes, made possible by its exclusive vane design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE...How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this helpful booklet is in your reference files by sending for your copy now!

NOW SELLING...

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U. S. A. and foreign countries.

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ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

A trip through the barking drums is the first step for this southern pine, on its way to becoming pulp at Hudson's giant Florida Multiwall Sack mill. Logs are tumbled until stripped of all bark.

Wood is next reduced to chips like these. Whirling knives devour a 5-foot log in 10 seconds. The mill consumes 700 cords of pine daily.

Digesters 5-story high cook the chips under pressure in a scalding chemical solution. This reduces the wood to pulp.

Here is why HUDSON can guarantee Multiwall Sacks against breaking on the packer

REASON NUMBER 2 HUDSON MAKES ITS OWN PULP

Wood pulp makes up 96 percent of the raw materials for your Multiwall Sacks. By growing its own wood, and manufacturing its own pulp, Hudson exerts iron-clad control of Multiwall Sack quality and delivery schedules. This is another reason why Hudson guarantees to replace *without cost* all Hudson Multiwall Sacks that fail on your packing or closing machines.

After the pulp is washed, beaten, and screened, it looks like this. Note long fibers that give added toughness to Hudson Multiwall kraft.

HUDSON

MULTIWALL SACKS

the World's most fully GUARANTEED

HUDSON PULP & PAPER CORP., Dept. 116, 505 Park Avenue, New York 22, N.Y.

SEND TODAY: How to store your sacks for maximum performance

Profusely illustrated folder shows you the scientific way to store your sacks. Step by step procedures that improve the performance of your sacks by up-to-minute storage methods. No obligation.

MAIL THIS COUPON NOW to Hudson Pulp & Paper Corp., Dept. 116, 505 Park Ave., New York 22, for literature and full information.

NAME _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

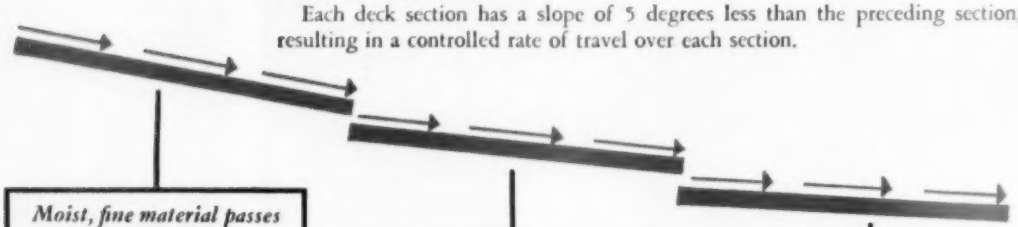
Ripl-Flo SCREEN with Tri-Slope DECK

SCREENS

Moist Fine Material

No excessive blinding and no shutdowns to clear the screen! With the "Tri-Slope" deck you can screen moist ½ x 0 to ¼ x 0 granular materials having high surface moisture. And you'll get more capacity than with a single slope deck of the same area.

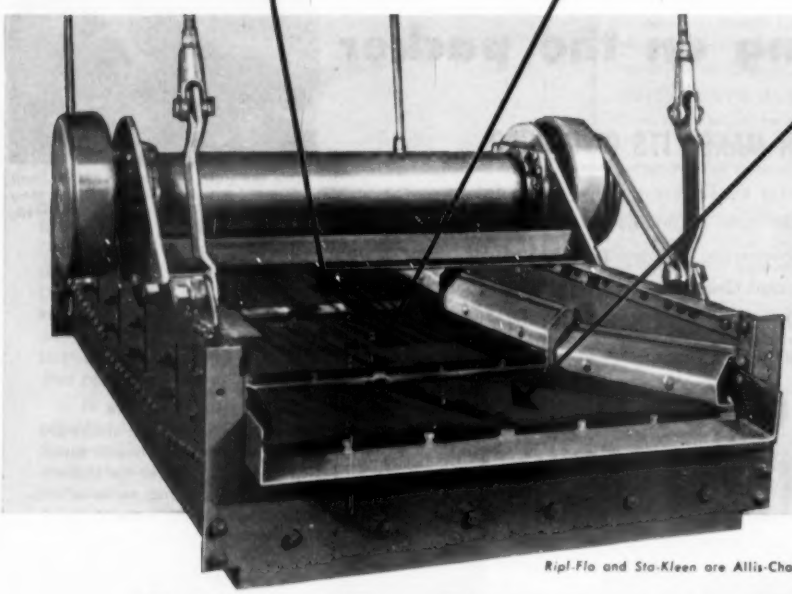
Each deck section has a slope of 5 degrees less than the preceding section, resulting in a controlled rate of travel over each section.



Moist, fine material passes rapidly over the feed end section to reduce the depth of the bed.

It is then retarded on the intermediate deck to maintain proper bed depth.

It is slowed down still more on the discharge end section to pass marginal size particles.



Each section of the "Tri-Slope" deck is designed for rapid stratification of the bed, resulting in high capacity. Moist, clogging particles are dislodged by the *Sta-Kleen* feature, consisting of bouncing rubber balls between the screen cloth and a ball retaining deck. The A-C representative in your area will gladly give you more details. Call him, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3995

Ripl-Flo and Sta-Kleen are Allis-Chalmers trademarks.

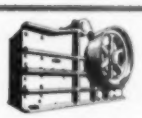
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

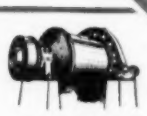
Hammermills

Vibrating Screens



Jaw Crushers

Gyratory Crushers



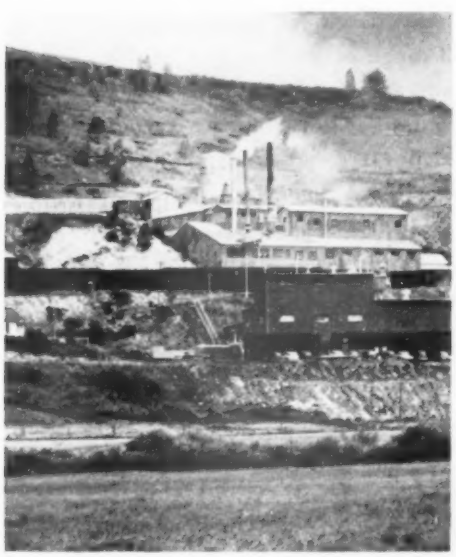
Grinding Mills

Kilns, Coolers, Dryers

At United States Gypsum's plant

Belt reinforced with "Cordura" rayon solves tough transportation problem

Timbered tunnel, left center above, houses conveyor belt reinforced with "Cordura" rayon. The belt is in two sections with a total length of 2,800 feet. Over slope 5.5% downgrade and 7.6% upgrade it travels 250 feet per minute, with a capacity of 100 tons of gypsum per hour.



Whether to go around a hill with railroad track or road, or over it with aerial tramway, or through it with a belt conveyor was the problem faced by the engineers of United States Gypsum's Heath, Montana, plant. They decided on a belt conveyor through the hill as most logical and most economical.

The belt, pictured above, was manufactured by Goodyear Tire & Rubber Company, on a carcass of Du Pont Cordura* High Tenacity Rayon.

Now, for a few cents a ton, gypsum is transported from the mine to the mill. The engineers found that belting reinforced with "Cordura" has greater strength and better troughability. That's because man-made "Cordura" rayon yarn is inherently stronger than yarn of natural fibers. It is made of endless strands with no short ends to part under stress. Stretch is reduced to a minimum. "Cordura" thus permits a thinner . . . yet stronger . . . belt, which is naturally more flexible, sits more snugly on the center idler—and therefore trains and troughs better.

Find out about conveyor belts made with "Cordura" rayon. We'll be glad to send you the names of suppliers . . . also give you complete information about "Cordura" in the booklet "Sinews for Industry." For your FREE copy, write: Textile Fibers Dept., Room 2520-R, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware. (*Offer good in the United States only.*)

*REG. U. S. PAT. OFF.

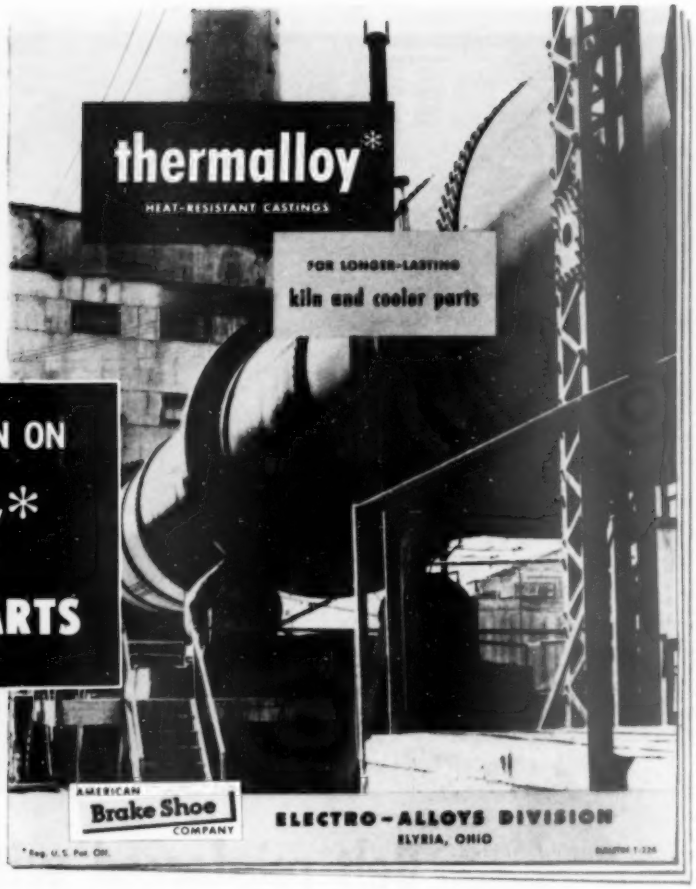
Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

"Watch for 'Cavalcade of America' on television"



SEND FOR THIS NEW BULLETIN ON

thermalloy*

KILN AND COOLER PARTS

See why heat-resistant Thermalloy kiln and cooler parts give longer service life and lower maintenance costs

You get all the facts about Thermalloy kiln and cooler parts in this new and descriptive bulletin.

You will find that Thermalloy is a tough heat-resistant and abrasion resistant alloy developed specifically to take heavy loads and rough usage. You will be able to study detailed diagrams showing how Thermalloy segmental kiln ends are designed to eliminate warping. You will see how Thermalloy feed ends and pipes are easy to install and readily adaptable to your kiln requirements.

Send for your free copy today. Write Electro-Alloys Division, 4005 Taylor Street, Elyria, Ohio and ask for Thermalloy Bulletin T-226.

*Reg. U. S. Pat. Off.

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO

make set-ups faster

. . . spot holes easier — get better fragmentation, faster drilling speeds, lower costs

Use a Le Roi-CLEVELAND T286 Self-Propelled Dual Drill Rig

It's 2 Le Roi-CLEVELAND patented air feeds and drills with air-motor booms mounted on a 25-hp tractor

3 speeds forward . . . 1 speed reverse

ONE man *drives* the Le Roi-CLEVELAND T286 places you couldn't get to before with a wagon drill. And he tows the compressor right along. The T286 drills and cleans holes as deep as 30′ — in any direction — at any angle — with less air. All this means faster set-ups, better hole spacing, greater footage, better fragmentation, lower costs. Have your Le Roi distributor show you. Write for Bulletin RD-21.

One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need to operate the T286 Dual Drill Rig, when it is equipped with Le Roi-CLEVELAND 4"-bore drifters. A smaller compressor is sufficient, when the T286 is equipped with the 45-lb. H10 or 80-lb. H23 (3⅛"-bore) sinker drills or 3½"-bore D25 drifter.

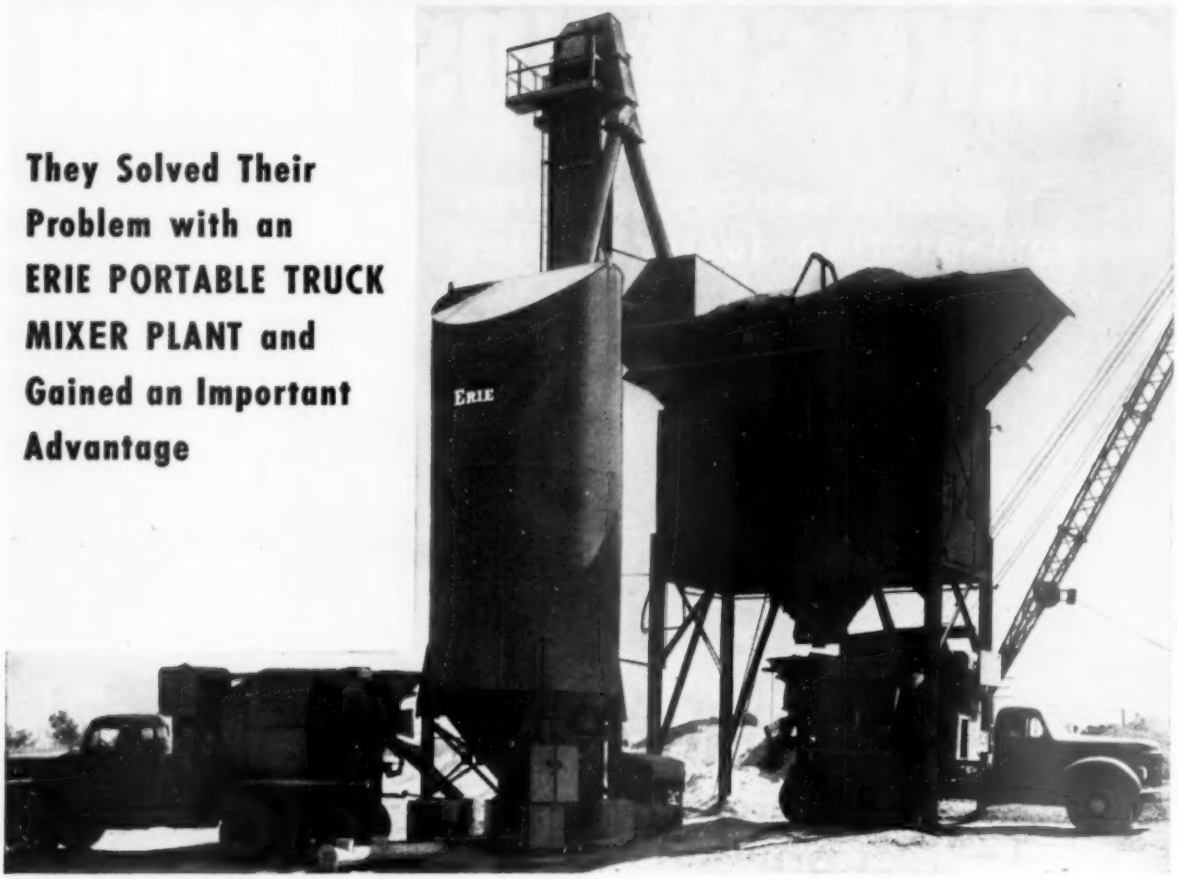
C-144

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION
12500 Berea Road, Cleveland 11, Ohio
Plants: Milwaukee, Cleveland and Greenwich, O.

HERE'S HOW MACDOUGALD-WARREN LICKED ATLANTA'S GROWING PAINS AND KEPT CONCRETE COSTS DOWN

They Solved Their Problem with an ERIE PORTABLE TRUCK MIXER PLANT and Gained an Important Advantage



MACDOUGALD-WARREN'S . . . ERIE PORTABLE TRUCK MIXER PLANT GTES-79 WITH 600 BBL. GROUND SILO

Atlanta's development and growth program posed a problem for MacDougald-Warren, one of the South's ready-mix operators. Much of the construction is in the newer parts of town, away from MacDougald-Warren's central location. This meant long hauls . . . fewer trips . . . higher costs.

An Erie Portable Truck Mixer Plant licked this time-cost problem and gave MacDougald-Warren an important advantage to boot.

Said Mr. Edward Kelley, "Our Erie truck mixer is portable and also gives us central plant capacity, In one run it averaged 60 yards for nine hours straight. We'll use our Erie Portable here in Atlanta and on jobs throughout the south."

This installation is only one of hundreds where an Erie unit is helping to beat a time-cost problem. It can do as much for you. We invite you to consider and field test our equipment.

More Facts About Erie's GTES-79 Portable Truck Mixing Plant

One man can operate this unit at full capacity.

It's pre-assembled into large sections which make set-up and take down fast and easy. Stows compactly for over-the-road transit too.

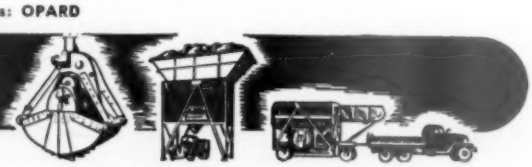
Phone or write for Booklet GS, Dept. P53

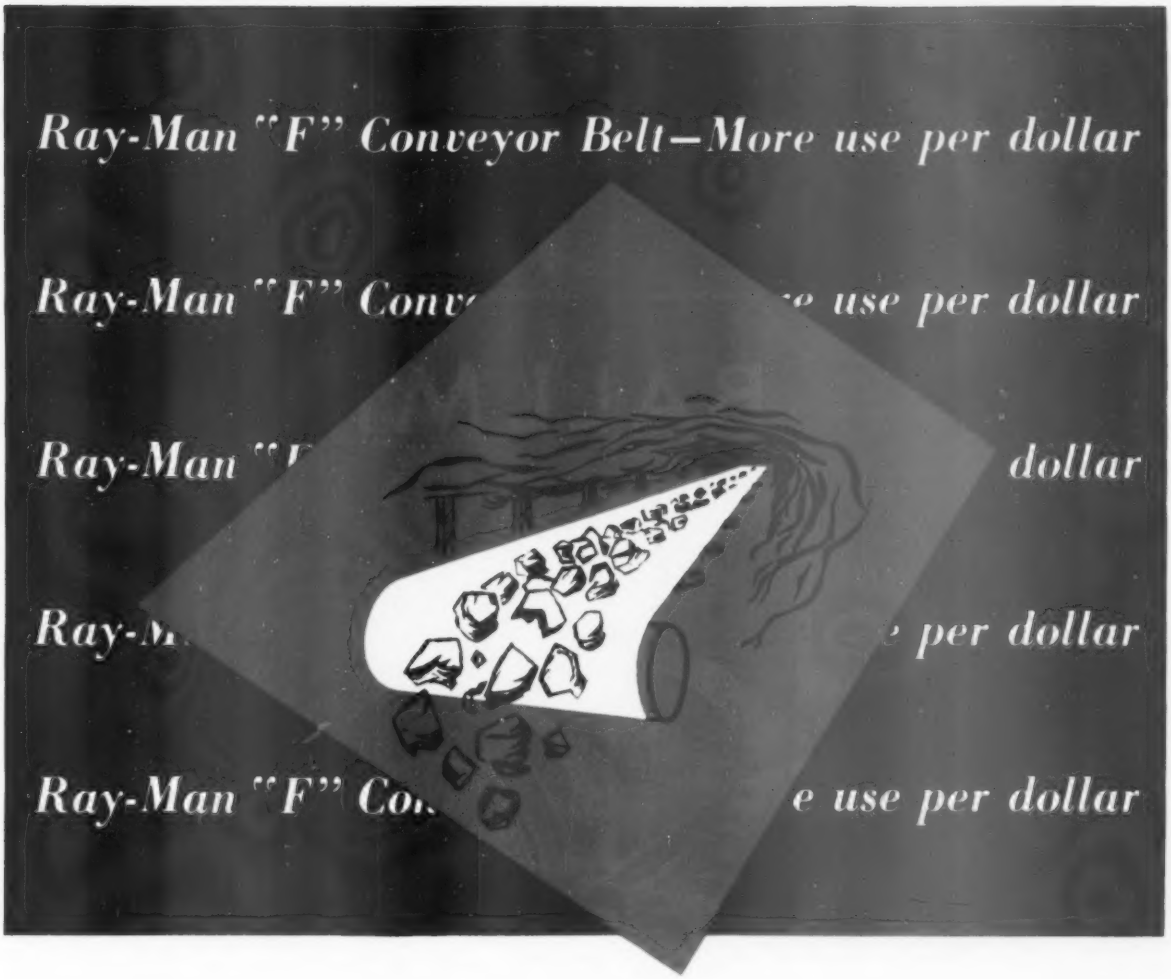
Cable Address: OPARD

ERIE

STEEL CONSTRUCTION COMPANY

3911 GEIST ROAD • ERIE, PENNSYLVANIA





ON ABUSIVE HAULS... Ray-Man "F" will cut costs where your conveyor belts are commonly exposed to tearing or puncturing . . . where pulleys are small . . . where fastener failure is a particular problem. The unique properties of synthetic fiber strength members make possible these advantages. Ray-Man "F" also gives you everything you require in a general purpose belt—flexibility, troughability, impact resilience, ease of training, strong cover adhesion—MORE USE PER DOLLAR. Ask the R/M distributor for Bulletin 6915. Ask him, too, about Homocord, R/M's extra-cushioned conveyor belt for heavy impact loading. R/M field engineers back him up to give you MORE USE PER DOLLAR—not only in conveyor belts, but in hose, transmission and V-belts.

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

"WE HEAR..."

June, 1953

Construction contract awards in the 37 states east of the Rockies totaled $5,186,238,000 for the first four months of 1953, or 10 percent above the corresponding period of 1952, according to an F. W. Dodge Corp. report. The first 3-month total was 11 percent above corresponding 1952 figures. According to Dodge Corp. figures, however, even if the total should continue to slip 1 percent in each remaining month, 1953 would still be ahead of 1952 at the end of the year. For the month of April, non-residential was the strongest classification. The total was $680,330,000 or 51 percent over March and 21 percent higher than April, 1952. Residential awards were 11 percent higher than March, but 1 percent below April, 1952. Heavy engineering and public works and utilities were up 32 percent over March and 10 percent over April, 1952.

* * * * * * * * * *

Waste products from paper mills, which once polluted rivers and streams, are now being utilized as by-products. The sulphite paper industry, to comply with new anti-pollution laws, had to find a new outlet for the spent liquor sulphite. Resulting research found many commercial uses, such as: a road-surfacing binder material; a fuel brick, made of coal dust, cemented together with sulphite liquor; feed for yeast bacteria; and uses in textile dyes, adhesives, food flavors. The by-product business has proved so successful commercially that one company is already expanding its plant to boost output of chemical by-products by more than 60 percent.

* * * * * * * * * *

As recently reported in Vermiculite News, one of the world's largest collections of rare eggs, representing the lifelong avocation of a South Carolina contractor, was recently trucked 230 miles without one egg being cracked or damaged. The collection of 100,000 eggs, which was willed to a college zoology and entomology department, was protected from shock during transit by placing the eggs in individual tray compartments and covering them with vermiculite.

* * * * * * * * * *

A midwestern sand and gravel company is building up a lot of community good will and winning favor with the town's "diaper set" (who might be future prospective customers), by inaugurating a standing offer to supply sand and deliver it, free of charge, for any youngster's sand box.

* * * * * * * * * *

A bill has been introduced into the Florida State Legislature which is designed to prevent dumping of phosphate wastes into the Peace River. The bill, if passed, will provide stiff penalties for offenders. According to proponents of the bill, the river is sometimes turned milky white by wastes, as far as 100 miles away from Polk County where the operations are located. It was claimed that the wastes enter the river when reservoirs, holding phosphate sludge, break, causing the overflow to empty into the river.

* * * * * * * * * *

More than $600,000 was recently mailed to the 1000 employes of Potash Co. of America's South Mesa, N. M., plant, but the drawback was—it was money without purchase value. The company, in an effort to publicize the amount of money paid to the federal government by its employes, issued facsimile cash labeled "tax money," which represented the amount the company was required by law to deduct from the wages of its employes.

* * * * * * * * * *

A new rock-crushing machine, as yet unnamed, is said to be capable of pulverizing minerals without using any form of impact. Material, fed into the machine by belt conveyor, is said to be instantly pulverized by supersonic wave action. Though still in the development stage, U.S. Bureau of Mines engineers have indicated that it is applicable for use in the non-metallic field.

WE HEAR

The Construction Cost Index for May, 1953, as reported by Engineering News-Record, was 589.21 (based on 1913=100), or 0.08 percent lower than the record high in April. The Building Cost Index for May (also a 1913 base) was reported to be 426.47, or 0.04 percent lower than the April all-time high. From December, 1952, to May, 1953, the Construction Cost Index rose 0.3 percent, compared with a 1.7 percent increase during the same period of the previous year. The Building Cost Index is up 0.4 percent in the 1953 period, compared to a 1.1 percent climb in the first five months of 1952. However, new wage agreements now under negotiation in many major cities are expected to start pushing construction costs up again as new contracts are signed.

* * * * * * * * * *

A new soil conditioner, containing various "trace elements" obtained from several mineral products and by-products of the Black Hills, is now being commercially produced near Custer, S.D. The product is a result of several years of research by scientists and other persons interested in developing more nutritious foods. They worked on the theory that these essential elements should be put into the soil, rather than given to humans and animals through pills or injections. The resulting product, which includes such trace elements as iron, copper, iodine, manganese, sodium, boron, cobalt, fluorine, magnesium, sulfur, zinc, calcium and others, when used on test areas, was said to have produced larger, healthier and quicker-maturing plants. Such a soil treatment is said to last from eight to ten years on non-irrigated land and four to six years on irrigated land.

* * * * * * * * * *

As recently reported in The Wall Street Journal, E. I. DuPont de Nemours & Co. has developed a process to make pure silicon which, according to the company, may lead the way to more powerful and less bulky television, radio and other electronic and electrical equipment, because of the material's ability to withstand higher temperatures and to handle more power than other semi-conductors. Its use is expected to widen greatly the scope of developments with transitors and rectifiers and is expected to compete with germanium and selenium. Although the product is currently valued at $430 per pound, it was noted that a pound goes so far that the unit cost per application is only a few cents. Production at DuPont's pilot plant in Delaware is currently being used to supply extensive research programs throughout the U.S.

* * * * * * * * * *

Contract awards for heavy construction, nationally, totaled $6.375 billion for the first 21 weeks of 1953, or 20 percent higher than comparable 1952 awards, as reported by Engineering News-Record. Industrial awards, totaling $1,344 million, were 12 percent higher than in 1952; however, industrial awards in the second quarter of this year are running about half the level of the first quarter, causing the over-all gain over 1952 to shrink steadily in recent weeks. Highway awards are continuing to run high, totaling $646 million for the first 21 weeks, or 21 percent ahead of the previous record year of 1952. Bridge construction is at a record $311 million, a gain of 115 percent over 1952.

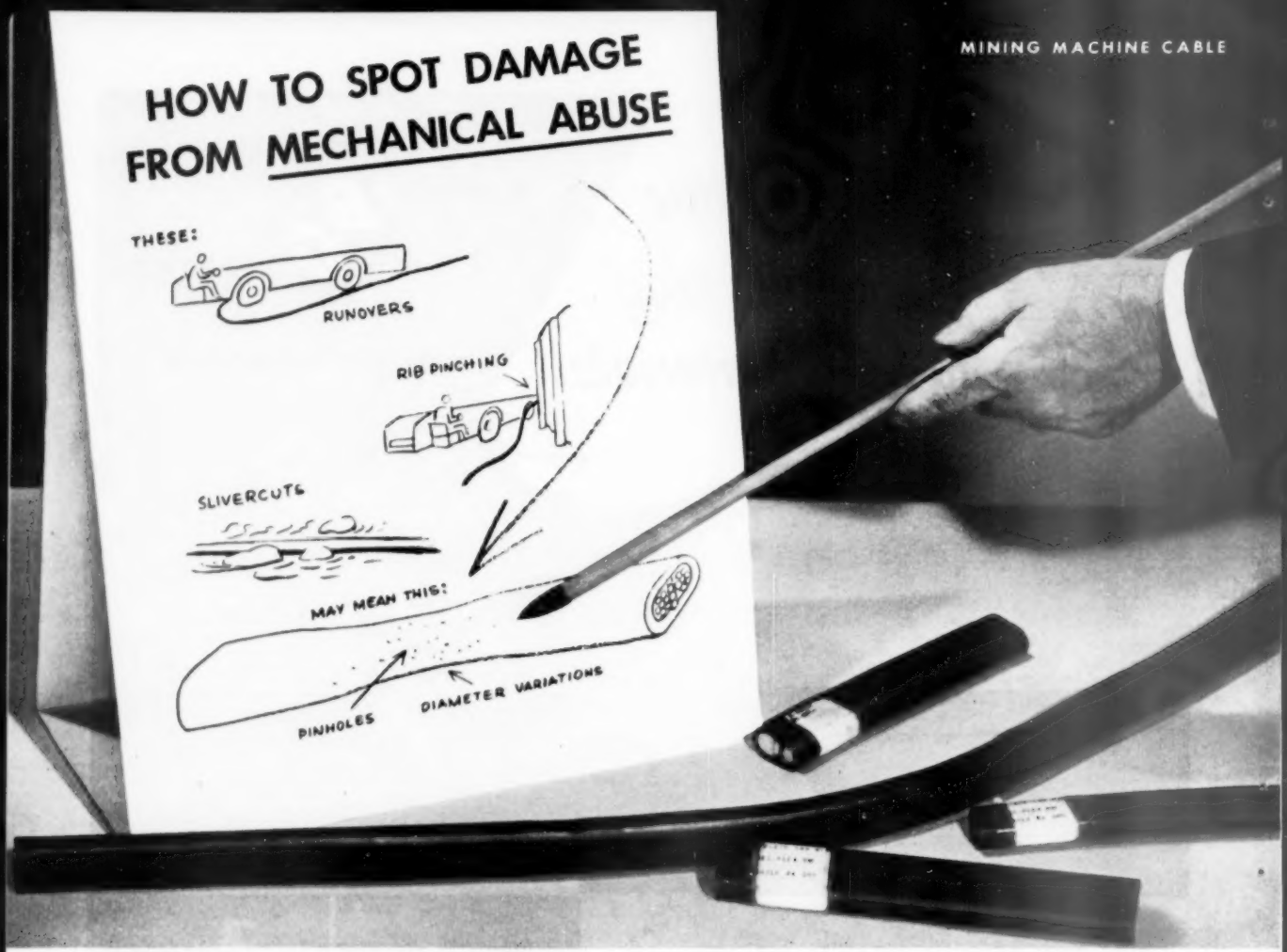
* * * * * * * * * *

The concrete vs. asphaltic pavement controversy, concerning the Ohio Turnpike, has erupted into a 4-fold controversy. There seems to be disagreement not only on the choice of paving material, but as to the design of each. The turnpike has been designed to handle an 18,000-lb. wheel load, which is double the maximum allowed on other highways in the state. To meet this wheel load, pike engineers have specified 10 in. of steel-reinforced, portland-cement concrete, with a 6-in. granular subbase material. A county engineer, although a proponent for concrete pavement, specifies a design calling for 9 in. of reinforced, portland-cement concrete, with a 3-in. subbase and, as an authority for his conclusion, he cited the "Concrete Pavement Design Manual" of the P.C.A. Similar differences of opinion are being aired on the proposed asphaltic paving design.

* * * * * * * * * *

A bill has been introduced into the Texas Legislature which, if passed, will impose a 2½-cent-per-ton severance tax on sand, gravel and crushed stone. Although the producers have pointed out that 84 percent of their products are used in work for various governmental agencies, opposition to the tax has thus far been unavailing. If additional state revenue must be raised, most producers would prefer a sales tax to a severance tax, because of the potential for passing the sales tax along. There are some states, however, which impose both sales and severances taxes.

THE EDITORS



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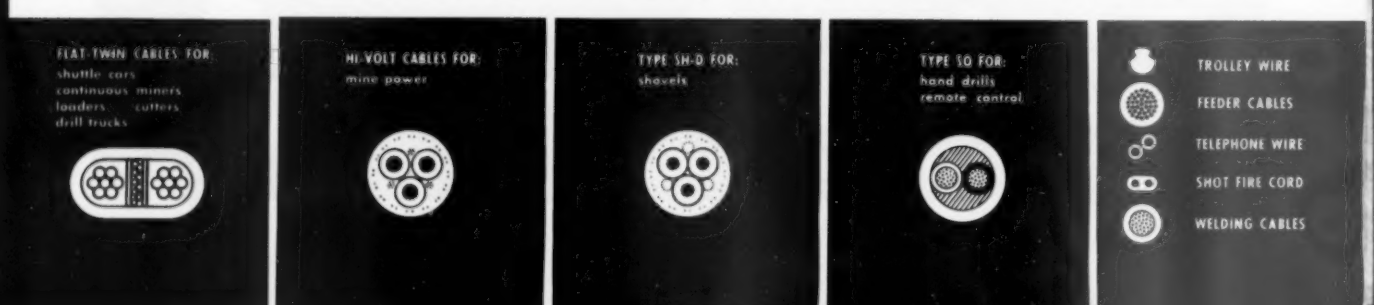

Are Toll Roads the Answer to the Highway Problem?

TOLL ROADS are looming large on the horizon as a partial solution to the critical need for more and better highways and, judging from all the proposals before the state legislatures, the half billion or more dollars budgeted for such road construction in 1953 may be but a small beginning. There are some nine turnpike authorities which have budgets set up and more than twenty states are considering proposals for such roads.

Supposedly, the toll road puts no drain on the taxpayer, and it therefore looks attractive to the public and to be an easy out to the problem of financing. Is it the ideal solution or are there considerations that offset this apparent advantage?

Political Factor

The Ohio Turnpike controversy, which has continued unabated for many months, makes one wonder if pay-as-you-drive roads are the best solution to the handling of through traffic. This 241-mile road across northern Ohio is a good example of what can happen when the jurisdiction for road building gets out of the hands of engineers into the field of politics.

Everything was set to start action, when the subject of competitive materials entered the picture, with the result that the Ohio Turnpike Commission and representatives of materials interests are involved in court action. While all this goes on, the best part of the 1953 construction season has been lost and previously drawn-up plans and specifications likely may have to be revised to accommodate materials not considered in the original proposals. This, we understand, may cost in excess of one million dollars, which is a needless waste that must be paid for by some source irregardless of financing methods behind the program.

Whatever the outcome of the dispute, this project certainly emphasizes how complicated it can become to have a toll road under control of an appointed commission. The urgency of getting an important project built, and one that would spare many lives from traffic accidents, has been lost in a maze of charges and countercharges with the result that the date of completion is far in the future.

It seems to us that the public has an important stake in all these toll roads because it stands a good chance of having to foot costs that may not be evident at the time a road is built. If a toll road proves to be unsuccessful, it could well become a future burden to the state, which would require that tax monies be provided for its maintenance. Should such a road make some profits, then the question becomes whether or not earnings are being set aside to keep the road in serviceable condition. It is to be assumed, if the rate per mile of travel charged is sufficient to yield a profit, that the users should be entitled to have the roads maintained up to acceptable standards. But, is there assurance that that will be done?

Proposals have been made before at least one state legislature, which state has signed a bill permitting bond-financed highways to be established anywhere in the state, that no bond issued for financing a toll road should ever legally be permitted to become a state debt, but that does not answer the question as to who might have to maintain an unsuccessful project and pay the costs of upkeep. It looks as if the taxpayer will not necessarily be immune to contributing his part for some of the proposed highways. Certainly, those who use these highways will have to shell out a lot of money per mile of travel and they may well get tired of reaching for their pocket-books in order to pay a cent or two for every mile of travel.

Raising Funds

The problem of providing funds for financing all classes of highway construction continues a serious obstacle but one that can be licked by conventional methods of taxation. The extent to which trucking interests continue to put more and heavier trucks on the roads indicates that highway use is very profitable to them, and the great importance attached to the automobile by the average family would indicate that the driving public would be receptive to helping pay for what it wants. More education of the public along the lines of the promotion being put out in national advertising by large corporations, and newspaper articles on the subject of highways which are appearing with greater frequency, will have a powerful impact.

Substantial federal aid can become available, for matching by the separate states, even without raising the rates, if all the proceeds from the federal gasoline tax be turned over where they belong, which is in the federal-aid highway fund. This tax alone took in 800 million dollars in 1952.

Bror Nordberg

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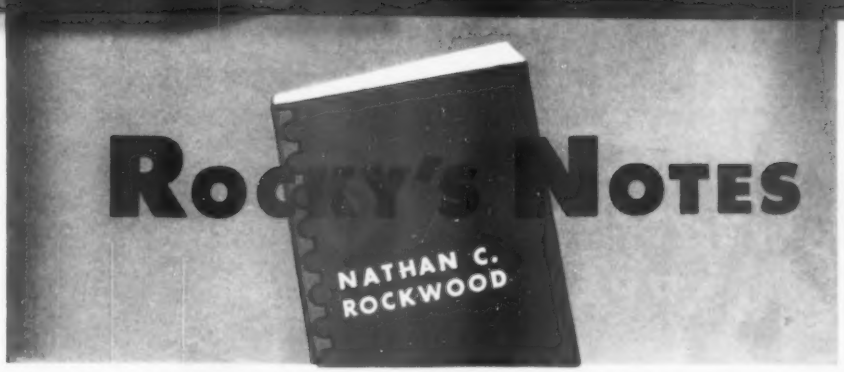

"Colloid Science" vs. Chemistry for Rock Products

PRACTICE, EXPERIENCE AND OBSERVATION precede development of any science; or, art precedes theory. One may find this true whichever way he turns; and a relevant example is "colloid science." Many industries which have been familiar to us for generations were practicing arts involving colloid science long before any one gave thought of it as a science. Tanning hides for leather, processing rubber for a variety of industrial uses, and manufacturing paints are three among thousands of such applications. Until some 30 or 40 years ago chemists thought they could explain satisfactorily every such process by the accepted broad science of ordinary chemistry. About then physicists stepped into the picture and proved to the chemists that in dealing with atoms and molecules as the "smallest and indivisible particles of a substance," they had not got to first base, because the atom itself is made up of still smaller particles. Therefore, chemists were compelled to recognize "physical chemistry," or the interrelation of physics and chemistry, since the hitherto undefined chemical forces were adequately explainable only by the facts and theories of physics.

Eventually, other curious scientists, in general also originally physicists, began to prove that the accepted laws of general chemistry did not give satisfactory explanations to a multitude of familiar operations, or common phenomena, and they developed "surface chemistry," or as it is now usually called "colloid science." In order to make regular chemistry apply, reactions or combinations or solutions, etc., must be reactions between atoms or molecules, and these must be in what chemists call stoichiometric proportions, which means in whole number atomic or molecular weight proportions. However, there were numerous instances of apparent chemical combinations and solutions where such a law as that requiring stoichimetric proportions obviously does not apply. Hence, it was apparent that particles of substance much larger than atoms and molecules do take part in chemical reactions. Thus "surface chemistry" was developed, to which the "regular" chemists gave scant attention—in fact many still give it little attention.

The early colloid scientists were so enthused with their discoveries and theories that they would have their new science cover practically the whole field of useful chemistry. For example, the chemists' idea of silicic acids was held to be ridiculous, that so-called solutions of silica in water were "colloidal sols"—in other words the "silicic acids" were merely particles of silica suspended in water; the silica was not ionized, or the element *silicon* was not actually in chemical combination with the ions of the water (H and O). This expansive attitude of the early colloid scientists probably had something to do with the hostility of the regular chemists, which to this day has not been dissipated. Yet, the early colloid scientists made it plain that they were actually extending chemistry to new conceptions and broader applications.

Learn the Fundamentals!

If the novice will start with these early authors, who recorded examples and facts based on familiar experience and experiment, he will become genuinely interested, and he will find the basic facts and ideas of colloid science very easy to grasp. As the science developed it inevitably became involved with more and more complicated mathematical concepts, and it also came to be written in a language of its own, neither of which developments can be easily absorbed by any but a specialist in the science. However, if the ordinary chemist will take the trouble to study a little colloid science he will find that chemistry and colloid science really do supplement each other, just as the early writers tried to demonstrate. With refined methods of studying the structures of substances, the relationship becomes more apparent. For example, it is now known that silica really does dissolve in water to form silicic acid; that is separate tetrahedra or ions of silica are dispersed in water in extremely dilute solutions; but the greater part of the silica alleged to be dissolved in stream or surface water is actually in the form of aggregates or clusters of silica tetrahedra—from two to perhaps several thousand or more—as colloid particles in a colloid sol.

Generally, in geochemistry it apparently does not make a great deal of difference in which form the silica occurs. In the formation of petrified wood, for example, silica as a "solution" filters through the pores of the wood and gradually, in the course of probably thousands of years, replaces the substance of the cellulose fibre, retaining all the original interior structure of the wood. This could have been accomplished either by silica in true chemical solution or by colloidal silica, depending on the size of the pores that the silica had to penetrate. So, in all chemical reactions the primary difference between so-called real chemistry and colloid science is chiefly one of the size of the particle involved. In colloid science the chemical reactions take place on the surface of the particle without necessarily involving its interior chemical structure, but when *surface* is mentioned it must always be remembered that the surface of interior channels and pores accessible to the reacting substance is included in the term *surface activity*.

Since all common minerals with which we deal in concrete making are porous, and are nearly all only slightly soluble in water, it follows that geochemical reactions based on the theory of chemical solutions and recrystallization must require a very long time—not a year or two, but probably thousands of years. All this obviously has a bearing on the hydration, hardening and aging of cement and concrete. The most plausible explanations of the relatively rapid reactions lie in the realm of colloid science, if only as a supplement to present ordinary chemical concepts. Early writers on colloid science included cement reactions in their province, and their ideas on the subject are usually only referred to now in modern books on portland cement chemistry. Yet in spite of a half century of trying to explain cement and concrete with ordinary chemical conceptions alone—with scant success—the great majority of cement and concrete researchers still neglect to apply an immense amount of newly acquired knowledge from colloid science.

Colloid Chemistry Applied?

So far as we know, recent research in cement and concrete has made use of but one concept of colloid science and that is T. C. Powers' work at the Portland Cement Association laboratories to account for the properties of water or moisture in cement gel or paste. This is one of many phases of colloid science that could find application in such research; and although Mr. Powers has been discussing this subject for several years before various scientific societies, some of whose members should be keenly interested, he seems to have failed to inspire other cement and concrete researchers to follow through. Indeed, while they have signally honored him for his research, we doubt if many have taken the trouble to thoroughly understand it.

As we have suggested before, it would be well for the novice to start

(Continued on page 110)

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LABOR RELATIONS TRENDS

Special Care in Writing "Call-In" Clauses in Union Contracts

By NATHAN C. ROCKWOOD

EVEN THE BEST INTENTIONED and most experienced employers have often to learn by unfortunate incidents that one can not be too careful in the wording of union contracts. Most labor unions now employ sharp, shrewd lawyers who seem to take delight in embarrassing employers. This may not be entirely an evil for it also teaches employers to be more careful in drawing up contracts, and if both parties enter into such a contract with full and mutual understanding, obviously there would be fewer controversies. What follows is self explanatory, and is a verbatim report of an arbitrator called in to interpret the meaning of a "call-in" clause in a contract between the National Gypsum Co. and some of its employes who were represented by the United Gas, Coke and Chemical Workers of America, Local 247 (C.I.O.).

Arbitrator's Report

"There are two grievances. One was filed in behalf of a pump man (Mines Department, maintenance); and the other was "plantwide" for both production and maintenance workers.

"The grievance of the pump man was worded as follows:

" 'Pump man had been getting call-in pay for Sundays before four-hour call-in clause was installed into contract. Now company maintains he should still receive only three hours' pay. Union maintains he is covered by the call-in clause and should receive four hours as he is a maintenance man.'

"The 'plantwide' grievance was as follows:

" 'Article V. Sec. 16 of contract. Men are not getting four hours call-in pay when they are required to report for work other than their regular shift when they are told to report beforehand. Company maintains it does not apply. Union maintains it does apply and was a practice before four hour was installed in place of three hour.'

"Article V, Section 16: 'Whenever any employe is required to report in or is called in at times other than during his regular shift, he shall be guaranteed at least four (4) hours of pay at the rate of time-and-one-half (1½) his regular rate.'

"Mr. Seufert, plant manager, in his letter requesting arbitration wrote that 'there is a question as to interpretation of the terms of the contract dealing with 'call-in.' "

Call-In Before Regular Shift

"The meaning of 'call-in' has been raised in a number of arbitrations. From a reading of some of the cases it seems clear that much depends upon the actual wording of a section which provides for call-in pay. A review of a few of the decisions by arbitrators may be helpful.

"Diamond Alkali Co.: 'Contract requiring that employes called in for emergency work shall receive at least four hours' pay does not require that four hours' pay be added to the regular pay of an employe who is called in before the beginning of his regular shift and works continuously, until the end of his regular shift . . . .'

"The arbitrator took the position that the situation in this case was no different than that of an employe working overtime at the end of his shift. In other words, beginning work before shift time and continuing to work into the shift was just a case of overtime—not call-in.

"Sheller Mfg. Corp.: 'Under contract which (1) provides for payment of time-and-one-half for time worked 'before and after' regular hours and (2) guarantees minimum amount of time or pay for call-ins, employe who is called in early and works straight through until end of his regular shift is properly paid at time-and-one-half rate for time *actually worked* before his regular starting time, even though such time is less than amount of time guaranteed by call-in clause.' (Emphasis supplied by arbitrator).

"The arbitrator in this case suggested that call-in pay was to provide adequate compensation for each trip to plant and that employe who is called in early makes no extra trip.

"Dayton Malleable Iron Co.: 'Under contract providing for four hours' call-in pay when employes are called to work without having been properly notified that there will be no work, employer is not obligated to guarantee four hours' pay to cleaning woman hired with understanding that work would take from three to four hours. To understand purpose of call-in pay clauses, which is to compensate employes who are compelled to waste time and travel expense because of lack of work which is no fault of theirs, is to acknowledge in applicability of such clauses to instant situation.'

"Mundet Cork Corp.: 'Under clause providing four hours' pay at time-and-one-half to employes called in for emergency work, employe who was called in for emergency work one hour before his normal starting time and worked continuously until the end of his regular shift was entitled to four hours' pay at time-and-one-half for hour worked before start of shift in addition to eight hours' pay for regular shift. Contention that clause was intended only to compensate employes for extra trip to and from plant is rejected since contract does not so provide. Further claim that first three hours of regular shift may be offset against the four hours' emergency pay may not be considered since submission limits arbitrator to consideration of proper pay for hour's work before start of shift.'

"The arbitrator in the Mundet Cork Corporation case was aware of the awards in the Diamond Alkali and the Sheller Manufacturing Corporation cases. Although he admitted that the facts of the Mundet Cork case were quite similar to those of the Sheller Manufacturing Corporation case, he 'reversed' the Sheller case because he considered that the way the issue had been submitted required a finding for the union rather than for the company as had been done in the Sheller case.

"The Mundet Cork Corporation opinion emphasized the point that if the men had come in at 6:00 a.m. and worked just a half hour (to 6:30 a.m.) and then gone home and returned at 7:00 a.m. for his regular shift he would have been entitled to four hours call-in pay for the half hour worked. Therefore, it did not seem reasonable to allow only one hour (at time-and-one-half) for the hour worked between 6:00 a.m. and 7:00 a.m. just because the employe did not have the privilege of going home between his 'emergency' work and his regular shift work.

"The Diamond, Sheller and Dayton cases were decided for the company and against the union. The Mundet Cork Corporation case for the union. Thus the weight of precedents seems to be three to one in favor of the company interpretation.

"However, in the judgment of the arbitrator in the instant case, the award must turn upon the interpretation of the *provision in the contract*, that is, Section 16. This Section 16 differs significantly from the provisions in the contracts which were the basis of the arbitrations cited above.

"Section 16 states that an employe shall be "*guaranteed*" four hours' pay at time-and-one-half whenever he is required to '*report-in*', or is called in at times other than during his regular shift.

"When an employe comes in at 5:00 a.m. either on the basis of notice on

(Continued on page 148)

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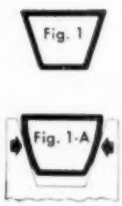
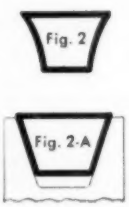
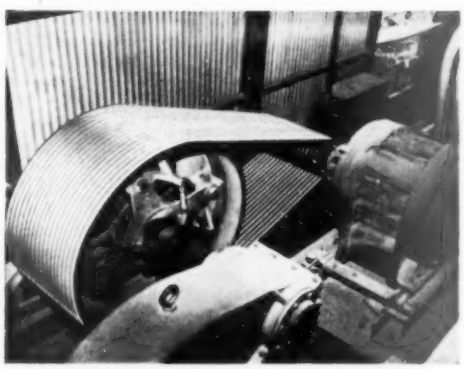
Take any *straight-sided* V-Belt (Fig. 1) and bend it as it bends in going around its pulley. You will clearly see its sides *bulge out* (Fig. 1-A). These sides therefore press *unevenly* against the V-pulley and this causes extra wear at the point shown by arrows (Fig. 1-A).



Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2).

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means longer belt *life* and *lower* belt *costs* for you.





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PEOPLE in the news

Executive Vice-President

HERBERT P. BUETOW, executive vice-president in charge of finance, Minnesota Mining and Manufacturing Co., St. Paul, Minn., has been named president of the company. He succeeds

Herbert P. Buetow

Richard P. Carlton who becomes vice-chairman of the executive committee and continues as a member of the board of directors and of the finance committee. Mr. Buetow joined the company as auditor in 1926 and became controller in 1935. He was made treasurer and a director in 1939 and has been an executive vice-president since 1949.

Mr. Carlton, who asked to be relieved of his duties for reasons of health, has been president since 1949. Starting as a laboratory assistant in 1921, he was elected a vice-president and director in 1929 and became executive vice-president in charge of manufacturing, engineering and research in 1948. One year later he was elected president.

On Board of Directors

ROBERT F. BLACK has been elected a director of the Medusa Portland Cement Co., Cleveland, Ohio, to fill the vacancy created by the death of Alva Bradley. Mr. Black is president of White Motor Co.

P.C.A. President

CARL D. FRANKS has been elected president of the Portland Cement Association, Chicago, Ill., to succeed the late Frank T. Sheets, who passed away in November of 1951. Mr. Franks was formerly executive vice-president and will be succeeded in this position by G. Donald Kennedy, who has been serving as vice-president for the past year. E. F. MacArthur has been named treasurer. He succeeds A. B. Stall, who died in February of this year.

Mr. Franks joined the association in 1916 as district engineer in charge of the Indianapolis office. Eight years later he was appointed midwestern regional manager, and served in that position until 1948 when he was made

Carl D. Franks

vice-president for promotion. In March, 1952, he was appointed executive vice-president, in which post he exercised the duties of president left vacant by the death of Frank T. Sheets. Mr. Franks graduated from Purdue University with a B.S. degree in civil engineering.

Mr. Kennedy became connected with the association in 1950 as consulting engineer and assistant to the president and for the past year has served as vice-president. After obtaining a degree in civil engineering from the University of Michigan, Mr. Kennedy served in municipal activities in Michigan. In 1933 he joined the State Highway Department of Michigan, later becoming highway commissioner of that state. In 1942 he was elected president of the American Association of State Highway Officials, and from 1943 to 1950 served as vice-president of the Automotive Safety Foundation, Washington, D.C. He received the George S. Bartlett award in 1948 for "outstanding contribution to highway progress."

Mr. MacArthur joined the accounting department of the association in 1941, and for the past six years has served as assistant treasurer. Prior to joining the P.C.A., he was connected with Price, Waterhouse & Co., Chicago accountants. From 1943 to 1946,

Donald Kennedy

he served with the Finance Department of the U.S. Army. Mr. MacArthur graduated from Northwestern University with a B.S. degree in commerce.

U.S. Gypsum Promotions

ANDREW J. WATT has been appointed assistant general merchandise manager of the United States Gypsum Co., Chicago, Ill. He was formerly assistant to the vice-president in charge of sales. Denny E. Ames has been named sales manager, gypsum wallboard, New York division, and William F. Roden has been made Connecticut district sales manager. Mr. Watt joined the Pittsburgh district office of U.S. Gypsum in 1938 and became manager of the Syracuse district in 1947. Two years later he was appointed division sales manager of paint products in New York and became sales manager of paint products in 1950. He has been assistant to the vice-president in charge of sales since 1952.

Plant Manager

MYRON READ has been appointed manager of the Fort Dodge, Iowa, gypsum plant of Certain-teed Products Corp., Ardmore, Penn. Mr. Read joined the company in 1945 as a mining engineer.

Association President

WILLIAM F. SMITH, vice-president of Black Brollier, Inc., Houston, Texas, has been elected president of the Texas Concrete Masonry Association.

Chief Engineer Retires

WALTER J. MAYTHAM, chief engineer and one of the original members of the Northwestern States Portland Cement Co., Mason City, Iowa, which he joined in 1906, has retired after 47 years with the cement company and 56 years in the cement industry. Known as the "father of the cement plant," Mr. Mayhem has designed and built many cement plants in the United States and Canada. Throughout his career he has been a student of all phases of engineering and has kept abreast of new techniques and changes each year by constant study and building of his own engineering library. A native of Buffalo, N.Y., Mr. Maytham was educated in the Buffalo public schools. He attended Bryant and Stratton Business School and took a four year mechanical engineering course at Cornell University. Later he took electrical engineering courses at Cornell University and the University of Michigan. He started his career in the cement industry in 1897 at the Bay Bridge, Ohio, plant of the Sandusky Portland Cement Co., subsequently joining the engineering department.

General Manager

JOHN H. ROBINSON has been appointed general manager of Gypsum, Lime and Alabastine, Canada, Ltd., Toronto, Canada. He is also a director and has been on the operating staff of the company since 1921. He was formerly general works manager and will be succeeded in this position by W. G. Smith, formerly general superintendent of the standard lime division in Quebec. Both Mr. Robinson and Mr. Smith are members of the Canadian Institute of Mining and Metallurgy.

Manager of Dealer Sales

L. B. HARTNETT has been appointed manager for gypsum product sales to dealers of Certain-Teed Products Corp., Ardmore, Penn. He was formerly Cleveland district sales manager and will be succeeded in this position by S. C. Marshall. R. E. Schilling has been named St. Louis district sales manager, and J. E. Barns, Jr., has been appointed assistant sales manager of the Philadelphia district.

Market Research Analyst

ROY DYGERT has been promoted to market research analyst of National Gypsum Co., Buffalo, N.Y. Formerly construction consultant in the Buffalo district sales department, Mr. Dygert has also served in the research department.

Named Superintendent

ROBERT B. GLENN has been appointed superintendent of Kingsport, Tenn., Plant No. 1, of the Penn-Dixie Cement Corp., Nazareth, Penn. He succeeds M. T. O'Connor, who has been assigned to the general engineering office at Nazareth. Mr. Glenn received his mechanical engineering education at Yale University. He joined Penn-Dixie in 1950 as a mechanical engineer and subsequently became maintenance and project engineer, which position he held until his present appointment.

Chief Engineer

RAYMOND L. WALSH, assistant chief engineer of the Universal Atlas Cement Co., New York, N.Y., has been appointed chief engineer. He joined

Raymond L. Walsh

the company at Chicago in 1925 as assistant electrical engineer. In 1929, he became electrical engineer and was appointed assistant chief engineer in 1944. Mr. Walsh is a graduate in electrical engineering of Armour (now Illinois) Institute of Technology, Chicago. He has participated in Portland Cement Association committee activities, working with the Bureau of Accident Prevention and Insurance on the subcommittee for Electrical Hazards in Quarry Operations.

Officers Re-elected

GORDON TONGUE has been re-elected president of the Northwestern Portland Cement Co., Seattle, Wash. Also renamed are: J. D. Burns, chairman of the board; J. A. Reuter, vice-president; Frank Kiernan, Jr., vice-president; D. G. Metcalf, secretary-treasurer; H. Johnson, assistant secretary-treasurer; and C. T. W. Hollister, chairman of the executive committee.

Heads Engineering Firm

H. H. MORGAN has been elected president of Robert W. Hunt Co., testing and consulting engineers of Chicago, Ill., and W. J. Bongard has been named vice-president. Other officers include L. H. Stott, vice-president; S. C. Sexauer, secretary; and W. F. Anderson, treasurer.

General Sales Manager

ED C. JANCIK has been named general sales manager for the Gulf Coast area of Texas Lightweight Aggregate Co., Houston, Texas, subsidiary of Texas Industries, Inc. He was formerly Texas branch manager of Super Concrete Emulsions, Ltd. Mat LaVail, general manager of the Texas Lightweight Aggregate Co. at Houston, has been transferred to the Dallas Lightweight Aggregate Co. at Dallas. Lewis Mims has been named general superintendent of the Stafford and Rosenberg plants of Texas Lightweight Aggregate Co.

Heads Mine Project

A. J. CAYIA, manager of mines and quarries of Inland Steel Co., Chicago, Ill., has been appointed to direct the company's iron ore mining project at Steep Rock Lake, Ontario, Canada. Mr. Cayia, who started with Inland in 1928 to develop the limestone quarry, preparation plant and harbor at Port Inland, Mich., was named vice-president and general manager of Caland Ore Co., Ltd., the Canadian subsidiary which leased the Steep Rock Lake ore deposit. Mr. Cayia is a member of the board of directors of the National Crushed Stone Association.

Secretary-Treasurer

FRANK L. STELLNER has been appointed secretary-treasurer of United States Gypsum Co., Chicago, Ill., to succeed Wayne Irvin, who has resigned to become vice-president and comptroller of Pullman, Inc., Chicago. Mr. Stellner was formerly director of purchases and will be succeeded in this position by H. C. Bear, who is taking over the same position held 48 years ago by his father, the late Robert G. Bear.

Re-elected President

RUSSELL RAREY has been re-elected president of the Marble Cliff Quarries Co. and the Arrow Sand and Gravel Co., Columbus, Ohio. Also renamed are: H. J. Kaufman, chairman of the board; E. J. Kaufman, vice-president; R. H. Pausch, secretary-treasurer; U. C. Kaufman, assistant secretary-treasurer; and Stephen Stepanian and R. C. Ninde, directors.

Named Geologist

REID M. WALTMAN has been appointed geologist for the Southwest Potash Corp., Carlsbad, N.M. George G. Hollinger has been named industrial relations manager, and Lynn Pennington has been made assistant industrial relations manager.

Engineer Retires

PAUL E. TODD has retired as engineer in the Los Angeles district office of the Portland Cement Association, Chicago, Ill., after 28 years of service. He is a graduate of Whittier College

and served in the engineering department of the city of Whittier before becoming city engineer, which position he held for many years before joining the Portland Cement Association. Mr. Todd has been active in freeway, airport and other concrete construction projects in the city and county of Los Angeles.

Works Manager

BEN MCCRUM, formerly with the Universal Atlas Cement Co., New York, N.Y., has been appointed works manager of Halliburton Portland Cement Co., Corpus Christi, Texas. He succeeds Holger Struckmann, who has resigned. Mr. McCrum has been associated with the cement industry for 36 years, half of which were spent at the Waco, Texas, plant of Universal Atlas Cement Co.

Heads Concrete Firm

CLIFF L. HODGERT has been named president and general manager of the Arizona Precast Concrete Co., Mesa, Ariz. Formerly vice-president and general manager of Archie McFarland & Sons, meat packers, Salt Lake City, Utah, Mr. Hodgert recently acquired an interest in the firm from Darl Anderson.

Sales Manager

LATHROP SMITH has been appointed sales manager of lightweight slag aggregate for the Economy Fuel and Supply Corp., Buffalo, N.Y., an affiliate of the Donner-Hanna Coke Corp. where Mr. Smith served in the sales department.

Vice-President Retires

W. O. BOVARD, vice-president and director of the Canada Cement Co., Ltd., Montreal, Canada, has retired after 42 years of service with the company, but will continue as a director.

Named Vice-Presidents

MAX M. MULLER and Harvey N. Barrett, Jr., have been appointed vice-presidents of Basic Refractories, Inc., Cleveland, Ohio. Dr. Muller, who holds a master's degree in mechanical engineering from the Swiss Federal School of Polytechnics in Switzerland and a Ph.D. in ceramic engineering from Ohio State University, will direct operations and engineering. Mr. Barrett will have charge of sales activities. He received his A.B. degree in mineralogy from Ohio State University. Harley C. Lee, vice-president, has been named a director of the company, and George E. Stone has been appointed chief engineer.

Transferred to New Orleans

R. R. HOLLIBAUGH, assistant chemist at the Bonner Springs, Kan., plant of the Lone Star Cement Corp., New York, N.Y., has been transferred to the New Orleans, La., plant. Mr. Hollibaugh will be succeeded at Bonner Springs by Elmer Smith of the Greencastle, Ind., plant.

Heads Cement Sales

E. J. FOX has been appointed manager of sales for the standard portland cement division of the Diamond Alkali Co., Cleveland, Ohio. He was formerly sales manager of the division and succeeds B. H. Beverstock, who has retired. Mr. Fox has been with the company since 1925.

Calaveras Vice-Presidents

EDGAR M. BARKER, manager of the San Andreas, Calif., plant, Mel J. London, general sales manager, and Arnold M. Ross, assistant vice-president, have been named vice-presidents of Calaveras Cement Co., San Francisco, Calif. H. C. Maginn continues as executive vice-president, and A. A. Hoffman as vice-president. William Wallace Mein, Jr., is president of the firm, and William Wallace Mein is chairman of the board. A finance committee was appointed consisting of H. C. Maginn and Charles W. Fay, with Joseph Tedesco, secretary-treasurer, as alternate member. Grant Metzger, mechanical superintendent, has been appointed acting manager of the San Andreas plant.

Chief of Engineers

MAJOR GENERAL SAMUEL D. STURGIS, JR., has been appointed chief of engineers, U.S. Army, to succeed Lt. Gen. Lewis A. Pick, who has retired. Gen. Sturgis was formerly commanding general of the communications zone of the United States Army in Europe. He graduated from the United States Military Academy in 1918 and commissioned a second lieutenant in the Corps of Engineers.

Elected Directors

R. H. B. SMITH, vice-president in charge of sales of Dragon Cement Co., Inc., New York, N.Y., has been elected a director of the company. Nils Anderson and E. Spencer Miller have also been named directors. Mr. Anderson is chairman of the board of Debevoise-Anderson Co., and Mr. Miller is president of the Maine Central Railroad.

Director of Advertising

JAMES D. ELGIN has been appointed director of advertising and sales promotion of the National Gypsum Co., Buffalo, N.Y. He was formerly assistant to the vice-president of the Pabst Sales Co. in Chicago.

General Sales Manager

H. RAY COYLE has been appointed general sales manager of Pacific Coast Aggregates, Inc., San Francisco, Calif. He was formerly sales manager of the building materials and ready-mixed concrete divisions.

Edgar M. Barker

Arnold M. Ross

Mel J. London

Operating Assistant

R. P. SCOTT has been appointed operating assistant of Penn-Dixie Cement Corp., Nazareth, Penn. He succeeds Herbert W. Rich, who has resigned to accept a position as vice-president of Dominion Minerals, Inc., Piney River, Va., an affiliate of Riverton Lime and Stone Co. Mr. Scott has been in the cement industry for many years. A graduate in mechanical engineering from the University of Kansas, he was associated with the engineering and production departments of Universal Atlas Cement Co. for 15 years. He was manager of the manufacturing research division of the Portland Cement Association from 1945 to 1947 and for the past five years has served as superintendent of the Toledo plant of Medusa Portland Cement Co. Mr. Rich joined Penn-Dixie in 1941 as quarry superintendent at Plant No. 4 and a year later was appointed plant superintendent, becoming division superintendent, North, in 1949. When this position was abandoned, he was appointed operating assistant.

Joins Southern Firm

A. HARRY WAGNER, formerly with the Concrete Pipe and Products Co., Inc., Richmond, Va., has become associated in the management of Southern Contractors, Inc., Richmond, which is affiliated with the Southern Brick and Supply Co., Inc. C. Alfred Purkins and A. Lee Hunt, Jr., have announced the reorganization of the Southern Brick Co., Inc., into the two new companies, without change in personnel or policies of the concerns, with the exception of the appointment of Mr. Wagner.

N.C.M.A. Chairman

OTTO BUEHNER, Buehner Cinder Block Co., Salt Lake City, Utah, was named chairman of the promotion committee of the National Concrete Masonry Association, Chicago, Ill., at the recent convention. He succeeds Philip Paolella, executive vice-president of Plasticrete Corp., Hamden, Conn.

Sales Manager

BOB REID has been appointed sales manager of the Lakeside Gravel Co., Bellevue, Wash. He joined the company in 1949 as a salesman covering Mercer Island, and has since served in various departments of sales and traffic management.

Executive Assistant

PETER S. HASS, formerly assistant works manager at the Permanente, Calif., plant of Permanente Cement Co., Oakland, Calif., has been appointed executive assistant to Wallace A. Marsh, vice-president and general manager, with headquarters in Oakland. Mr. Hass joined the company six years ago as an engineer and administrative assistant and has been particularly active in the research

Peter S. Hass

and development program. He was in charge of developing Permanente's nodulizing process for reusing kiln dust to increase the plant's capacity by 200,000 bbl. of cement per year.

Sales Manager

A. T. GUMPER has been appointed sales manager of Builders Equipment

A. T. Gumper

Co., Phoenix, Ariz., manufacturer of the new Superlite unloader. Mr. Gumper is well known in the concrete industry, having been sales manager for Miles Manufacturing Co., Jackson, Mich., for the past 32 years.

Elected Vice-President

WILLIAM C. HOMER has been elected vice-president and general manager of Barnes & Cone, Inc., Syracuse, N.Y. He was formerly sales manager.

On Lecture Tour

P. W. ABELES, consulting engineer and lecturer on prestressed concrete for graduates at the Brixton School of Building, London, England, who visited the United States last November and December, took part in the Western Conference on Prestressed Concrete, arranged by the University of California, Los Angeles, where he read a paper on "Prestressed Concrete Design and Construction Practices in England." During his stay in this country Dr. Abeles was guest lecturer on prestressed concrete at Massachusetts Institute of Technology, Cambridge, Mass.; Lehigh University, Bethlehem, Penn.; California Institute of Technology, Pasadena, Calif.; University of California, Berkeley, Calif.; University of Illinois, Urbana, Ill.; Western Society of Engineers; Stevens Institute of Technology, Hoboken, N.J.; University of Mich., Ann Arbor, Mich.; and Illinois Institute of Technology (Northwestern University), Chicago, Ill.

Assist Vice-Presidents

ZANE P. LAURINI, formerly with the engineering division of Texas Lightweight Aggregate Co., Houston, Texas, has been appointed assistant to Cedric Willson, vice-president and chief engineer of Texas Industries, Inc., Dallas. Mr. Laurini is a graduate of the University of Houston. Walter D. Rosenberg has been named assistant to Arthur Clark, vice-president in charge of concrete masonry operations. A graduate of Duke University, Mr. Rosenberg was formerly with the sales department of Texcrete Co., Corpus Christi. Alfred E. Kenneweg, a graduate of Baylor University, has joined the accounting division of the company.

Heads Ready Mix Group

GEORGE TEWS, Tews Lime and Cement Co., Milwaukee, Wis., has been elected president of the Ready Mix Concrete Association of Wisconsin, Inc. Ray Palmer, Verona Redi-Mix Co., Verona, was elected vice-president, and Harold C. Mulvey, Twin City Transit Mix Concrete Co., Neenah, was re-elected secretary-treasurer.

General Manager

WILLIAM BOORHEM has been appointed general manager of the Bridgeport Materials Co., Dallas, Texas. He was formerly vice-president and general manager of the Malvern Gravel Co., Malvern, Ark.

Alpha Appointments

N. O. WAGNER has been appointed assistant vice-president of Alpha Portland Cement Co., Easton, Penn., and J. E. Sweitzer has been named general sales manager.

General Superintendent

VIRGIL SEWELL has been appointed general superintendent of all Haydite lightweight aggregate subsidiaries of Texas Industries, Inc., which

Virgil Sewell

include the Dallas Lightweight Aggregate Co., Texas Lightweight Aggregate Co., Louisiana Lightweight Aggregates, Inc., and Oklahoma Lightweight Aggregate Co. Mr. Sewell was formerly general mill foreman of General Portland Cement Co., Dallas, Texas, and previously was operating foreman in charge of the company's quarry in Fort Worth. Prior to that he was purchasing agent and plant foreman for Consolidated Cement Co., Fredonia, Kan., and Jackson, Mich. Mr. Sewell is a native of Coleman, Texas.

Purchasing Agent

PAUL W. VEZINA has been appointed purchasing agent for the Inland Lime and Stone Co., Gulliver, Mich. He succeeds A. L. Lavigne, who will retire this year.

OBITUARIES

CHAUNCEY D. NICHOLS, vice-president of the Oklahoma division of Ideal Cement Co., Denver, Colo., died April 20 at his home in Oklahoma City, Okla. He was 67 years old. A native of Grand Haven, Mich., Mr. Nichols studied law at the University of Michigan and moved to Oklahoma City in 1906. Four years later he became a salesman for the R. J. Clark Coal and Cement Co., which was later purchased by the Oklahoma Portland Cement Co. He became vice-president of the latter concern in 1920 and remained in that position when the firm became the Ideal Cement Co.

JOHN STRONG NEWBERRY, retired treasurer of the Medusa Portland Cement Co., Cleveland, Ohio, and son of the founder of the company, passed away April 13 at his home in Sarasota, Fla., where he had resided since 1938. He was 70 years old. Born in Cleveland, Mr. Newberry graduated from University School in 1902 and from Yale University in 1906. He resigned from active participation in business in 1920 to pursue a literary career, teaching English and history at Massachusetts Institute of Technology from 1921 to 1928, and from 1931 to 1933 he taught at Harvard University and Radcliffe College. Mr. Newberry moved to Sarasota in 1938 and became headmaster of the Out-of-Door School for ailing children, from which he retired five years ago.

MARION C. FARACI, president and founder of the American Mica Works Corp. and the Mica Insulation Co., Newark, N.Y., died March 25. He was 74 years of age. Born in Italy, Mr. Faraci was graduated from the University of Palermo and received a doctor of jurisprudence degree from the University of Naples. Known as an authority on mica, Mr. Faraci served as an adviser to the War Production Board during World Wars I and II, and had recently been an adviser to the National Production Authority.

THOMAS J. WALSH, vice-president of the Nelsen Concrete Culvert Co., East St. Louis, Ill., died suddenly on March 17. He was 52 years of age and had been associated with the company since 1937. He was also a director of Concrete Pipe, Inc., Evansville, Ind., and a director of Tuscola Builders Supply Corp., Tuscola, Ill. A graduate in chemical engineering of the Catholic University, Washington, D.C., Mr. Walsh was a former director of the American Concrete Pipe Association.

DWIGHT D. GUILFOIL, vice-president and general sales manager for Sauerman Bros., Inc., Chicago, Ill., died suddenly on May 3. He was 66 years old and had been associated with the company since 1913, with the exception of a period during World War I, when he served with the 108th Engineers in France. Mr. Guilfoil had been active at various times in the affairs of the Manufacturers' Divisions of the National Sand and Gravel Association and the Associated Equipment Distributors.

JOSEPH R. LAIR, retired Chicago district sales manager of the Universal Atlas Cement Co., New York, N.Y., died May 6 following a long illness. Born in Shelbina, Mo., he received his early education in Louisiana, Mo., Media, Ill., and later attended Wever Academy, Monmouth, Ill. He began his career as a salesman with Universal Atlas in 1915, and served in Iowa, southern and western Illinois, Nebraska and Indiana. In 1927 he transferred to the Chicago office, where he served successively as assistant city sales manager, assistant district sales manager, metropolitan Chicago sales manager, and Indiana-Michigan district sales manager.

RUTLAND LEVANGER, senior engineer and chief draftsman of Marquette Cement Manufacturing Co., Chicago, Ill., died March 13 after a short illness. Born in Chicago, Mr. Levanger received his primary and secondary schooling in Oslo, Norway. He received his masters degree in engineering from Darmstadt University in Germany. In 1926 he returned to the United States and joined the Marquette Cement Manufacturing Co. as an engineer at the Oglesby, Ill., plant.

HAROLD KOSSIE MUSGROVE, Bethel, Mo., was killed recently when the dump type truck that he was driving overturned, pinning him beneath it. He was 29 years old. Mr. Musgrove, his father, C. W. Musgrove, and J. W. Wood are owners and operators of the Bethel Rock and Gravel Co. He was born in Bethel, graduated from Bethel High School and served four years in World War II.

CORNELIUS J. CURTIN, SR., retired metropolitan representative for the U.S. Gypsum Co., Newark, N.J., died March 10 after a brief illness. He was 89 years old. Mr. Curtin was the founder of the Farnam-Cheshire Lime Co., Cheshire, Mass., which he sold to the U.S. Gypsum Co. in 1930. He remained with the firm as metropolitan representative until 1942 when he retired.

J. E. BARNES, former vice-president in charge of sales for the United States Potash Co., Carlsbad, N. M., died at his home in Greenville, Ala. He had retired in 1951 because of ill health but was retained by the company as a consultant until his death.

HARRY ERNEST NELSON, retired consulting engineer for Monolith Portland Cement Co., Los Angeles, Calif., died May 12 at the age of 78. A native of Golden, Colo., Mr. Nelson had resided in the Los Angeles area for 43 years. He retired in 1943.

CHARLES A. CONRAD, a director of the Bluffton Stone Co., Bluffton, Ohio, died April 16. He was 35 years of age. A native of Lima, Ohio, Mr. Conrad graduated from the Bluffton High School and served with the Army in World War II.

STANLEY A. DUNN, president of the Gravel Supply Co., Albany, N.Y., died April 27 after a year's illness.

DWIGHT E. MANLEY of the Manley Sand Co., Rockton, Ill., died suddenly on April 3.

"EAGLE 'SWINTEK' DREDGING LADDER IMPROVED OUR OPERATION 100%"

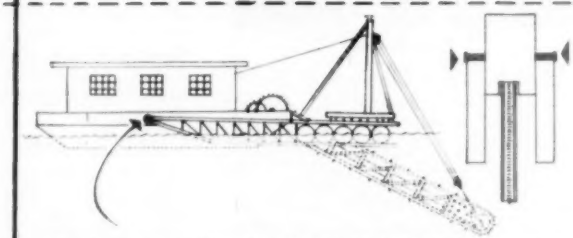
Reports WAPAK SAND & GRAVEL CO.

WAPAKONETA, OHIO

EAGLE Sand and Gravel equipment is much in evidence at the several plants of the Wapak Sand & Gravel Co., Wapakoneta, Ohio.

An Eagle "Swintek" Traveling Screen Chain Dredging Ladder recently installed at one of the Wapak plants is shown. It is a 40' Light Duty unit. Suction line is 8" up to the 6" pump. Production averages 70-tons per hour—half sand and half gravel.

Interesting feature—engineered by Eagle—is the pontoon system supporting the "Swintek". It is pivoted or hinged on the sides of the dredge at the center. Therefore, no matter in what position the "Swintek" may be, the load applied to the dredge is always applied at the center and there is no tipping action—dredge remains level.



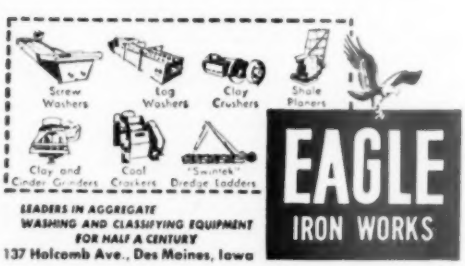
Pontoon supporting the "Swintek" is hinged at center of dredge—dredge remains level at all times.

Wapak reports 100% improvement in operations since installing the "Swintek". Shutdowns from clogged lines eliminated—uniform flow of material to the plant on shore.

Send for literature on the "Swintek".

Wapak Uses EAGLE Fine Material Washers, too!

Wapak's plants have used Eagle Fine Material Screw Washer-Classifier-Dehydrators long and successfully. One is in operation at the plant above where "Swintek" is in use.



industry news

Cover Picture

ON THIS MONTH'S COVER is an illustration of the mining operations of National Gypsum Co., Sun City, Kan.

The photograph shows a Plymouth locomotive, driven by a Caterpillar Diesel D 315 engine, pulling a train-load of gypsum rock from the mine. The mine is three miles southwest of Sun City, Kan. For this type of work, the mine locomotive and railroad trackage is a particularly efficient mode of transportation.

Limestone Plant

VESCO CORP., subsidiary of Fry Coal and Stone Co., Mercersburg, Penn., has opened a limestone quarry and plant in Springhill Township, Penn., on a 4500-acre deposit recently leased from B. A. Smith, former operator of Springhill Pulverized Lime Co. Vesco Corp. has installed approximately $500,000 worth of new equipment and machinery at the Springhill location. The plant produces seven sizes of road-crushed material in addition to agricultural liming materials and rock dust for mines. This is the company's first operation in southwestern Pennsylvania, but the company has large holdings in Virginia, Maryland and other parts of Pennsylvania.

Lone Star Expansion

LONE STAR CEMENT CORP., New York, N.Y., has started expansion of its Lone Star, Va., plant, which will increase capacity by 50 percent, to a total of 6600 bbl. of portland cement per day. (See ROCK PRODUCTS, August, 1951, p. 112, for complete description of the new plant.)

The plant, built about two years ago, was designed so that it could be expanded in minimum time from a two-kiln operation to three or more. New construction and facilities will include the installation of a third 10-x 340-ft. kiln, complete with air-quenching cooler; additional coal-pulverizing equipment with a capacity of 80 tons per day; an additional finish-grinding unit with 800-hp. motor drive and auxiliary equipment and additional dust-collecting equipment.

An additional 1000 tons of raw material per working day, mainly limestone and shale, will be required for the enlarged operation, bringing the total raw material consumption of the plant to 3000 tons per day. Another power shovel is being provided for use in the quarry.

The additional facilities, which are being installed without interfering with current production, are expected to be in production by November of this year.

Research Center

IDEAL CEMENT CO., Denver, Colo., is currently completing its new research and testing center at Laporte, Colo. The center, which has been under construction for more than a year, consists of a laboratory for testing cement, concrete and allied products; two chemical laboratories; a pilot plant; a drafting room; office facilities; and a geology department. The research center will serve the entire company which operates 13 plants between Louisiana and the Pacific coast.

Kaiser Gets Quarry Permit

HENRY J. KAISER CO., Oakland, Calif., has been granted a permit to operate a stone quarry in the Mitchell Canyon area of Clayton Valley, Calif. Application for the permit was filed last February, but the case had been pending due to protests and petitions from local residents. The permit was finally granted but imposes several restrictions on the use of certain roads, the routing of trucks, and the elimination of noise, dust and smoke.

Lime Company Reorganizes

LIMESTONE PRODUCTS CO., Cleburne, Texas, recently acquired by Batesville White Lime Co., Batesville, Ark., has been reorganized under the name of Texas Lime Co., to which the following directors have been named: Fred Dickson and L. J. Turner of Cleburne; and Louis Myers, Dudley Woodridge and Mrs. M. S. Stokes of Batesville. Officers are Louis Myers, president; Dudley Woodridge, vice-president and general manager; Mrs. Stokes, treasurer; Roy Anderson, secretary; and Francis M. McCorkle, assistant secretary and treasurer.

Gravel Plant

PHIL BECKLEY AND LARRY THOMAS, Roseburg, Ore., recently purchased the sand and gravel equipment of Tri-City Redy Mix and have established a sand and gravel plant near Myrtle Creek, Ore.

Moves Offices

THE AMERICAN ROAD BUILDERS' ASSOCIATION recently announced that its headquarters have been moved to the World Center Building, 918 Sixteenth St., N.W., Washington 6, D.C.

Lightweight Aggregate

CAROLINA SOLITE CORP., subsidiary of Southern Lightweight Aggregate Corp., Richmond, Va., is building a plant at Aquavale, Va., for the production of lightweight aggregate. The plant, which will cost approximately $1,000,000, is expected to be completed by November 1, 1953.

Six-kiln Solite lightweight aggregate plant of Southern Lightweight Aggregate Corp., at Bremo Bluff, Va. Cranes handle hot aggregate from kilns

Huron Expansion

HURON PORTLAND CEMENT CO., Detroit, Mich., is expanding its Toledo, Ohio, distribution plant by the addition of five reinforced-concrete storage bins. The new bins, 80 ft. in height, are being built adjacent to the plant's present six bins. Cost of the expansion is expected to exceed $100,000.

Huron's Toledo plant is one of 12 distributing points on the Great Lakes, all served from the company's Alpena, Mich., plant, by company-owned ships. New to Huron's fleet of ships this year is a 6000-ton ocean-going vessel recently converted into a bulk-cement self-unloader, featuring the company's "Air-Slide" unloader. The vessel has been christened the Paul H. Townsend, in honor of Huron's vice-president and general manager. The company's other ships are the S. T. Crapo, the John W. Boardman and the Samuel Mitchell.

Rated capacity of Huron's cement-producing plants is in excess of 7,000,000 bbl. annually, an increase of 3,300,000 bbl. since the end of World War II.

Gypsum Research Center

NATIONAL GYPSUM CO., Buffalo, N.Y., has started construction of its new $1,000,000 research center in Tonawanda, N.Y. General construction contract for the 47,200-sq. ft. building has been awarded to John W. Cowper Co., Inc. The new center, scheduled for completion by the end of this year, will engage in fundamental research in product development and technical service for company plants. About 100 people, mostly technical workers, will be employed. William H. Harding, director of research and assistant to the president, will be in charge of the research center.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of April and for the first four months of 1953 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded	
	During April 1953	During first four months 1953
Roads	4,589,639	11,907,538
Streets and alleys	3,272,605	7,970,992
Airports	1,675,093	5,047,399
Totals	9,537,337	24,925,929

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 20,215,000 bbl. of finished cement in March, 1953, as reported by the Bureau of Mines. This was an increase of 12 percent compared with the output in March, 1952. Mill shipments totaled 20,813,000 bbl., an increase of 30 percent over the March, 1952 figure, while stocks were 10 percent below the total for the same month in 1952. Clinker production during March, 1953, amounted to 21,179,000 bbl., an increase of 6 percent compared with the corresponding month of the previous year. The output of finished cement during March, 1953, came from 155 plants located in 37 states and in Puerto Rico. During the same month of 1952, 18,095,000 bbl. were produced in 151 plants.

Seeks Phosphate Mining Permit

INDEPENDENT CHEMICAL CO., Bartow, Fla., has applied to the Bartow city commission for a permit for phosphate mining operations within the city limits. C. A. Boswell, representing the phosphate company, made a proposal to the commission which, if the permit were granted, would help the city obtain land needed for right-of-way on a proposed truck bypass on company property north of the city. The company has offered to give the city, outright, all the land needed for the bypass, providing the company is given the privilege of mining its property which is within city limits, but only on a program approved by the city commission. The company also promised to rehabilitate the land when mining operations are completed.

Perlite Processing Plant

TENNESSEE PRODUCTS AND CHEMICAL CORP., Nashville, Tenn., has started production at its new perlite processing plant at Jacksonville, Fla. This is the firm's 13th processing plant, with the others being located in Tennessee, Arkansas, Kansas, Texas and Georgia. Cost of the new plant was said to be approximately $100,000. Raw material used at the plant is shipped by rail from Colorado, Nevada and New Mexico. Long-range expansion plans include another unit for producing perlite and installations for making allied products. H. M. Bradley is manager of the Jacksonville plant.

Adds Lime Kiln

AUSTIN WHITE LIME CO., McNeil, Texas, has started construction of a new kiln for the calcination of small stone. This is the company's fifth kiln and the installation also includes additions to the stone preparation and storage facilities, including two belt conveyors and two storage bins totaling about 500 tons combined capacity. The equipment was designed by Azbe Corp., St. Louis, Mo.

Buys Gravel Plant

CASS CORP., Essex Junction, Vt., has acquired the equipment and property formerly owned by Champlain Sand and Gravel Co., Inc. H. E. Warner is president and treasurer of the new corporation and Albert Cass is vice-president and secretary.

Expands Lime Plant

ROCKWELL LIME CO., Manitowoc, Wis., recently completed its expansion program, which included the addition of a 6 ft. 4 in. by 150-ft. rotary kiln for production of quicklime. A mechanical feeder, a series of elevators and conveyors, three storage tanks and a processing plant are included among plant facilities. In addition to quicklime, the company also produces agricultural limestone and crushed stone for road construction and concrete aggregate.

Acquires Asbestos Properties

LAFAYETTE ASBESTOS CO., LTD., Montreal, Can., recently announced the acquisition of a group of 17 claims, comprising about 1000 acres, in the Beaver Lodge Lake area of the Athabaska mining district of Saskatchewan. The company also owns asbestos property in the Eastern Townships of Quebec.

Adds "Service" Building

LONE STAR CEMENT CORP. is adding a 50- x 100-ft. concrete building to the facilities of its Bonner Springs, Kan., plant. Classified as a "service" building, it will be used primarily for safety meetings and other similar uses. "Tilt-up" type construction will be employed by Fox Construction Co., Kansas City, Mo., which has been awarded the construction contract.

Management Change

THE ESTATE OF R. C. RIED recently announced that the W. R. Bendy cement plant engineering firm, St. Louis, Mo., on May 1, 1953, assumed the management and direction of R. C. Ried-Engineers, New York, N.Y., which is to be followed by the merging of the two organizations.

COMING CONVENTIONS

June 12, 1953—
National Agricultural Limestone Institute, Directors Meeting, Edgewater Beach Hotel, Chicago, Ill.

June 12-14, 1953—
Concrete Products Association of Washington, Annual Summer Meeting, Monticello Hotel, Longview, Wash.

June 24, 1953—
Ohio Ready Mixed Concrete Association, Annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio

Perlite Institute Meeting

THE PERLITE INSTITUTE recently held its fourth annual meeting at the Hotel Sherry Frontenac in Miami Beach, Fla., with delegates from 33 perlite-producing companies from 31 states in attendance.

The institute completed final plans for launching its nation-wide "certification program" for perlite plaster aggregate. Under this program, participating perlite producers will display a certification label on bags of their plaster aggregate, guaranteeing that the aggregate was manufactured in conformance to A.S.T.M. specification C 35-52 T, and also signifying that the material is regularly sampled and tested by the independent Pittsburgh Testing Laboratory. More than 30 producers reportedly have applied for a license to use the label.

The members also approved a new comprehensive specification for mixing and placing perlite concrete, based on data recently compiled from results of research programs sponsored by the institute. A separate specification for the use of perlite concrete as a lightweight insulating fill for roof decks was also established and will be published soon.

The membership report revealed that two new members have joined the institute, namely: R. S. Allday Clay Products, Inc., Shreveport, La., and Perlite Products Co., Primos (Philadelphia), Penn., bringing the total membership to 49 members.

Perlite miners and processors from 31 states, attending the fourth annual meeting of the Perlite Institute, at Miami Beach, Fla.

Highlight of the meeting was the crowning of "Miss Perlite of 1953," who, with her runner-up, were presented trophies by President Lewis Lloyd, at a unique ceremony held at the hotel swimming pool. The two bathing beauties were launched into the pool on solid perlite concrete rings cast in the shape of life preservers, proving that concrete made with perlite is light enough to float. "Miss Perlite" was awarded a trip to New York City where she and the perlite concrete "life preserver" appeared on the Dave Garroway television show over the N.B.C. network.

Lewis Lloyd, president of Perlite Institute, presents trophy to Miss Loretta Annis, named "Miss Perlite of 1953." Esther Clair, right, was runner-up for the title

Cement Plant Expansion

SOUTHWESTERN PORTLAND CEMENT Co., Los Angeles, Calif., recently announced an expansion of production facilities at its Victorville, Calif., plant. Expansion was delayed during World War II and the early post-war years due to difficulties of acquisition of new machinery.

When present plans are completed, total capacity will be nearly double the potential capacity of the plant at the close of the war. Increased facilities will include additional machinery and equipment in all departments, including considerable enlargement of its quarry and transportation facilities, as well as clinker-production. The project currently underway involves the installation of an additional kiln, 10½ x 330 ft., to produce upwards of 2600 bbl. of cement daily. The enlarged facilities are expected to be in operation by the end of this year. The company also operates plants at El Paso, Texas, and Fairborn, Ohio. George E. Warren is president of the company.

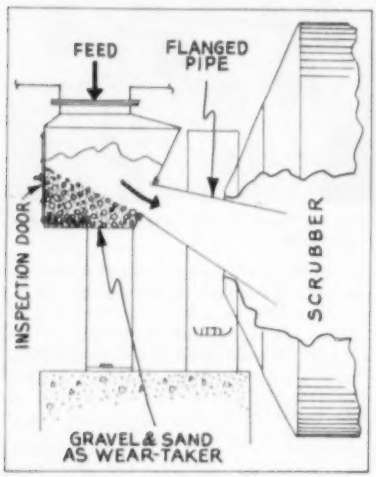
Re-Opens Limestone Quarry

COLUMBIA RIVER LIME Co., Longview, Wash., has resumed production of agricultural limestone at its Bear River quarry. The company has a contract to supply 25,000 tons of limestone for Burlingame Meeker Co., Amity, Ore.

HH

Scrubber and Ball Mill Feeders

A ROCK PRODUCTS PLANT in the Southwest uses a rotary scrubber screen as one unit and a Hardinge scrubber as a second. The design of



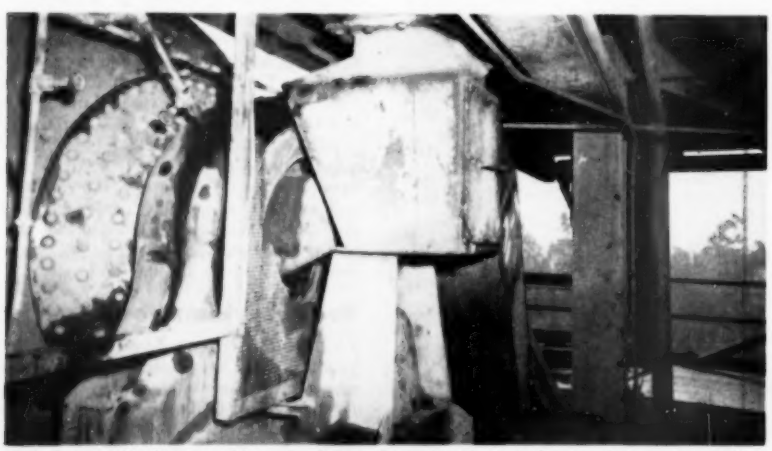
Flanged pipe receives gravel from 3- x 3- x 3-ft. metal box and discharges to scrubber

the plant required a reversal of direction of flow to the scrubber screen and a small series of step boxes were used. However, some wear resulted and the small size of the feed boxes made repairs difficult. These were then replaced by two metal step-feed boxes, each 4 x 4 x 4 ft. This size permitted the welder to get inside the box to make needed repairs. The boxes in use become filled with gravel so that incoming feed cascades from gravel to gravel, rather than metal to metal.

A somewhat similar situation was at the Hardinge feed chute. This wore out quickly, so a 3- x 3- x 3-ft. metal box was installed to receive the incoming gravel and large-diameter steel pipe installed to carry the

Two 4- x 4- x 4-ft. boxes "stepfeed" to scrubber; large size of boxes permits easy accessibility for repairs

gravel into the scrubber. The steel pipe is flanged with six bolts and, by turning the pipe periodically, the chute is said to last at least three times longer than the one previously used.



Feed chute to Hardinge scrubbers. Steel pipe, flanged with six bolts, can be turned one-third turn to get more wear

Conveyor Belt Drive Shelter

AT A SAND AND GRAVEL OPERATION in the midwest, motors and drives at the head pulleys of the conveyor

Welded channel steel sections provide overhead shelter for motors and drives

belts are protected from adverse weather conditions by overhead shelters which are constructed of welded channel steel sections, as shown in the illustration. Concrete block piers and I-beams support the conveyor belt structure.

Chain Hoist Tongs

MODERN SHOP FACILITIES are available in the concrete block plant of Janesville Sand and Gravel Co., Janesville, Wis., to make repairs to block machine and mixer equipment. In the illustration is shown how block machine molds are handled. On the floor

Chain hoist operates on an overhead trolley; hook at end of chain hoist engages tongs that grip mold box, enabling it to be raised or moved to any position

is a small dolly truck having channel iron suports to hold the mold box when it is moved from the block-machine room into the shop.

The dolly, holding the mold box, is wheeled into line with the overhead trolley chain hoist, and a hook at the end of the chain hoist engages the special tongs that grip the mold box securely when it is raised and moved to any desired position on the bench or to a point where repair machinery is to be used.

Conveyor System

AN INTERESTING FEATURE of F. M. Reeves & Sons', gravel plant at Pecos, Texas, is that the plant can be shut down at any time and started up again with the conveyor belt loaded, with the couplings absorbing the pick up shock load. In addition, all shocks and strains are cushioned out and the electric current demand for starting has been materially reduced.

Four conveyor flights are operated at the plant, all of which are equipped with Twin Disc hydraulic couplings. The plant has an operating capacity of 180 cu. yd. per hr. of standard gravel, or 350 cu. yd. per hr. of "West Texas Class A Topping" (a very fine gravel that is used for topping oil roads in west Texas).

Dust caused early failure of the original high-starting torque motors with exposed running parts. Repowering was engineered to include straight, totally enclosed, squirrel cage motors with hydraulic couplings.

The drives on conveyors No. 2 and No. 3 are operated by 25-hp. squirrel cage motors at 1170 r.p.m., each driving through a 14.5-in. Twin Disc hydraulic coupling. Conveyor No. 1 operates through a 30-hp. squirrel cage motor at 880 r.p.m., driving through a 17.5-in. HCB Twin Disc coupling. Conveyor No. 4 operates through a 50-hp. squirrel cage motor at 1170 r.p.m., driving through a 21-in. coupling.

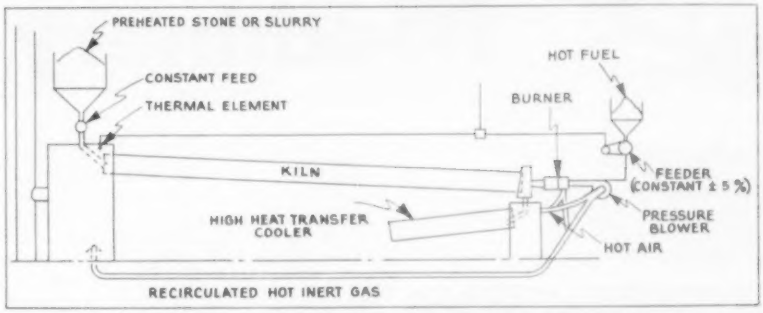
Higher Speed Rotary Kiln

A PATENT, recently awarded to Theron C. Tayler*, covers a burner and process for rotary lime and cement kilns of 200 to 500 ft. in length. Fig. 1 of the patent drawings is reproduced to indicate a portion of a processing method for which the burner was developed.

An essential characteristic of the burner is its combination of multiple concentric jets of different compositions, at comparatively high temperatures and travelling at widely different velocities to create a very long lime-calcining or cement-clinkering zone. No less important is the adoption of a scheme for stable automatic anticipatory control which not only alters the control-zone temperature, but also moves the hottest part of that zone forward or back in a way to maintain uniform quality of product. Eliminated are the customary manual controls of stone feed and kiln speed. The kiln operates at higher than the customary rotative speeds.

The patentee claims: the ability to double or triple the output of most long kilns; increased utilization of high level heat for high level work; a high degree of utilization of low level heat; increased flame luminosity for maximum generation of useful radiant heat; and constant high quality of product.

*Consulting engineer, 226 Marlborough St., Detroit, Mich.

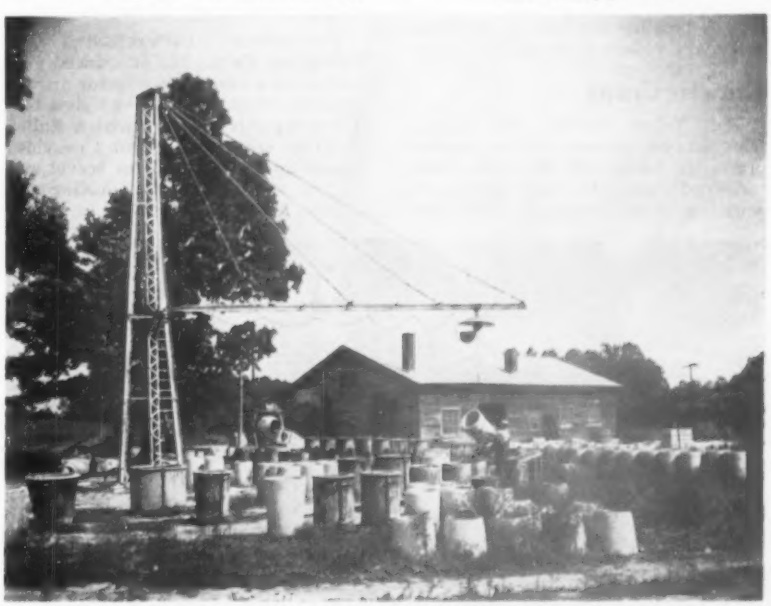


Kiln design includes new type burner to give long lime-calcining or cement-clinkering zone

Pipe Plant Installs Novel Handling Equipment

PRINCIPAL FEATURE of the production facilities at C. E. Sheets Concrete Pipe Manufacturing Co., a small producer in Clemmens, N.C., is a Yale Midget King electric hoist. The one-ton trolley-type hoist is mounted on a 25-ft. jib crane in this outdoor application. A special hood was fabricated for protection of the hoist from weather. The hoist does everything from unloading incoming raw materials to loading finished concrete pipe on delivery trucks. Its mounting on the jib crane permits coverage of a 270-deg. arc with 25-ft. radius, thus enabling it to take care of all hoisting jobs in the yard.

One of the operations handled by the crane is transferring buckets of concrete from the mixer to the pipe molds



General view of pipe plant, showing placement of jib crane to reach entire yard

NEW Machinery

Stone Splitter

THE GEO. F. SMITH CO., 5215 Manchester Ave., St. Louis 10, Mo., has developed a stone splitter, consisting of a manganese steel wedge which is

Stone splitter for breaking stone

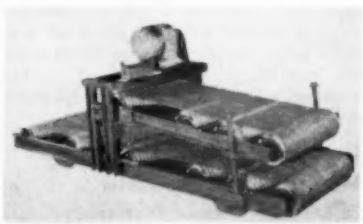
driven between two alloy steel slides that expand in parallel lines against the inner surface of the drilled hole. As the wedge is driven downward, ⅝-in. expansion takes place to cause rock, concrete, granite, etc., to split with a comparatively clean break and controlled direction. If mass concrete or unusually large stone is to be broken, the stone splitters should be used in sets, placed approximately two feet apart. If, for any reason the splitter should bind in the breaking process, it can be freed by prying the shoulders on the wedge or slide top. A possible application is in the secondary reduction of quarry stone.

Crawler Crane

THE THEW SHOVEL CO., Lorain, Ohio, has announced a 45-ton crawler crane, the Lorain 820-KS, with diesel-powered turntable and hydraulic coupling power take-off. The two-speed, chain-driven crawler is 18 ft. 6 in. x 14 ft. 2 in. with 48-in. wide tread shoes and two travel speeds in both directions. Open throat construction at the boom tip allows the hoist cables and hook block to clear the boom in vertical operations. A three-sheave, 50-ton hook block with swivel hook and bucket, plus a 5-ton ball and hook for whip line have been developed as standard equipment for this crane.

Bag Flattener

POWER-CURVE CONVEYOR CO., Box 1146, Denver, Colo., has designed a bag flattening machine. The portable



Bag leveling unit for handling burlap or paper bags

machine has two power-driven conveyors which carry burlap or paper bags between two rollers to create uniform thickness throughout the bag. It is 3½ x 9½ ft. and can be placed near packers or at the end of conveyors.

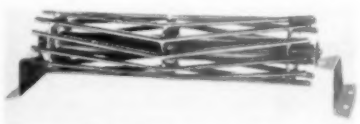
Tractor-Drawn Scraper

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif., has announced production of a two-wheel, tractor-drawn, 10-speed scraper, the Terra Cobra 142. The scraper is equipped with a Fuller 10-F1220 transmission which provides speeds up to 35 m.p.h. for travel and as low as 3 m.p.h. for loading the 17.5-cu. yd. scraper.

Ten-speed tractor-scraper

Return Rolls

BARBER-GREENE CO., Aurora, Ill., has introduced a self-cleaning "Chevron Rod" return roll designed to pre-



Self-cleaning return roll

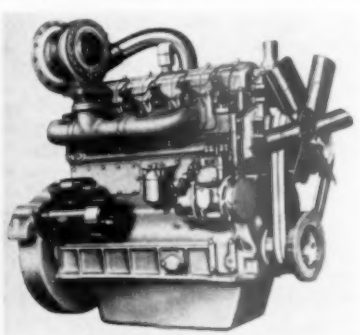
vent build-up on the return rolls supporting conveyor belts. The open design of the carrier and the vibrating action of the rods as they contact the belt insure less adherence and build-up on the roll, as well as exerting an aligning force on the belt, thus maintaining alignment and eliminating edge wear.

Speed Drive

REEVES PULLEY CO., Columbus, Ind., has introduced the Flexi-Speed drive, a variable speed unit designed for use in industrial equipment, including those with in-line or right angle reducers, countershafts, chain and sprocket or V-belt drives. It may be mounted in almost any position around the driven equipment, driven in any direction, and is capable of delivering speeds within a ratio of 8 to 1. It is available in ½-, ¾- and 1-hp. capacities, and six different length belts provide a choice of shaft center distances.

Diesel Engines

WAUKESHA MOTOR CO., Waukesha, Wis., has extended turbocharging to five of its relatively small engines, models 135-DKBS, 148-DKBS and WAKDS, for transportation or industrial service, and the larger models, NKDS and LRDS, as complete power units for industrial service, and



Turbocharged engine develops 185 hp. at 2800 r.p.m.

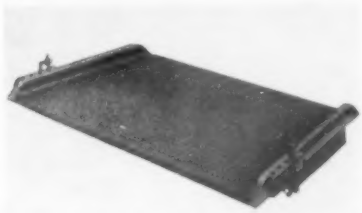
the larger models, NKDS and LRDS, as complete power units for industrial service. All of the engines are heavy-duty, 6-cylinder, 4-stroke cycle units and incorporate a spherical combustion chamber which aids in obtaining clean, complete combustion. An insulating air space surrounds the lower half of the combustion chamber and the retained heat is given up to the air during compression. This is said to reduce ignition lag and has the effect of advancing or retarding the time of combustion. The upper half of the chamber, including the injector mounting bore, is water-jacketed. Single orifice, pintle-type nozzles are standard equipment. On the three smallest engines the turbo is ordinarily top-mounted on the exhaust manifold, while on the two larger units the turbo is mounted on the rear end of the exhaust manifold. At the top engine speeds, the rotating elements of these turbochargers turn at a speed that may be high as 35,000 to 40,000 r.p.m.

Speed-Reduction Drives

THE AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Penn., has developed the "Shaft-King," a series of 20 to 1 ratio speed-reduction units featuring: two trains of single helical gears; use of ball bearings and tapered roller bearings where each can be utilized most effectively; three-wall housing; splash-lubrication; concentric shaft design placing input and output shaft above oil level; and a leak-proof, anti-friction oil-sealing system. Split tapered bushings with locking nuts are designed to eliminate fretting-corrosion and make the units adaptable to shaft sizes up through 3 $\frac{15}{16}$ in.

Loading Ramp

PENCO ENGINEERING CO., 25 California St., San Francisco 11, Calif., has brought out the Penco flared car-loading ramp made of lightweight magnesium and utilizing a full-range positive locking device. Crowned for different levels, the ramp is said to be non-skidding and has beveled edges to provide "no-jar" activity of materials handling equipment. It is 60 in. wide at car door end and 84 in. wide at the dock end. Made in 52 standard models, it can handle capacities of 3000, 6000, 8000 and 10,000 lb.



Flared car loading ramp to handle capacities to 10,000 lb.

Self-propelled scraper with 11-cu. yd. heaped capacity

High-Speed Scraper

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif., has introduced two high-speed, self-propelled Terra Cobra scrapers, the TH-B90, with a heaped capacity of 11 cu. yd., and the TH-B110, with a heaped capacity of 13 cu. yd. Both rubber-tired models incorporate positive hydraulic steering, air-operated power control and a roll-out ejector. High-ground clearance, short-turning radius and ample flotation and traction are combined to permit easy maneuverability. Model TH-B90 is equipped with a 150-hp. diesel engine while the TH-B110 has a 180-hp. diesel engine.

Motor-Operated Rheostat

WESTINGHOUSE ELECTRIC CORP., Box 2099, Pittsburgh, 30, Penn., has put on the market a motor-operated field rheostat, type RK, to adjust speed of d-c motors up to 200 hp. and voltage of generators up to 300 kw. Two cam-operated, snap-action limit switches are supplied with each unit, the cams adjustable over a 360-deg. range from front of rheostat and are available for 15-, 45-, 90-deg. travel. Gear ratios of travel from 5 to 15 seconds and 15 to 45 seconds can be supplied. Drive mechanism mounts on the front panel and up to three standard rheostat plates can be mounted on the rear of the panel with all components readily accessible for inspection or adjustment.

Side-Dump Truck Body

EASTON CAR & CONSTRUCTION CO., Easton, Penn., has developed Model BL-1530, a lift-door, side-dump, truck body with a capacity of 30 tons. This model incorporates the standard Easton lift door design except for special floor reinforcing plates of 4- x 1-in. abrasive resistant steel which are welded into position. An external overhead hoist handles dumping. The body is mounted on a Dart Model 300, diesel-powered, 6-wheel chassis.

Lift-door, side-dump body mounted on diesel chassis

Braided Sling

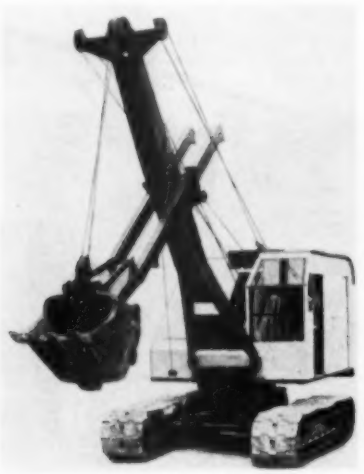
A. LESCHEN & SONS ROPE CO., St. Louis 12, Mo., has developed an 8-part, braided sling which features a

Wire-rope sling with pin-locked thimbles

reusable thimble fitting. No evidence of undue wear is said to exist with up to 20 percent "over-abuse" to the sling. The thimbles are attached by pins rather than clamps and may be removed, when the sling wears out, to be installed on the new sling.

Crane Shovel

LITTLE GIANT CRANE & SHOVEL, INC., Des Moines 13, Iowa, has incorporated various improvements in its model "S" shovel. It features a twin dipper stick with a cable-crowd drum, a patented ball-bearing turntable which eliminates rollers and center pin, and patented quick-release internal band clutches. The main machinery deck rotates on 358 1-in. dia. steel balls, while self-aligning, sealed cartridge-type bearings are used on all main shafts. The unit may be converted to crane, pile driver, dragline or trench hoe and is available either truck-mounted or separate. Dumping radius is 21 ft.; dumping height, 15 ft. 3 in.; digging depth, 3 ft. 6 in.; and its full swing has 6 r.p.m.



Power shovel of ½-cu. yd. capacity

Fractional Motors

GENERAL ELECTRIC CO., Schenectady 5, N.Y., has introduced two fractional-horsepower motors for applications requiring moderately high starting torque. Rated at ½ and ¾ hp., 1725 r.p.m., the motors can be mounted

Motor for moderately high starting torque

in any position, and can be reconnected at the terminal board for 115 or 230 volts. The motors have starting currents which conform to NEMA standards and are an extension of the ¼-½ hp. Form G series inaugurated last year.

Power Steering

AIR-O-MATIC POWER STEER CORP., 24 Noble Court, N.W., Cleveland 13, Ohio, is marketing its 1953 model power steer booster which utilizes compressed air for automatic, full or no-load steering on commercial-type vehicles. Constructed mainly of anodized aluminum, it is said to be rust and corrosion resistant. One end of the booster is fastened to a stationary member of the vehicle and the other end to a movable part of the steering linkage. There are no reservoirs, no pumps, no fluid to leak away and only one air line.

Electric Hoist

HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 46, Wis., has brought out the Zip-Lift electric hoist with rope control. The hoist, with all the features of the standard P & H models has, along with "one hand" rope control, double brakes, oil bath lubrication, fully-enclosed construction, and grease-packed motor bearings. The unit is said to provide a

"One hand" rope control hoist

weight-overload safety factor of five times the rated capacity. It is available with lifting capacities of 500 and 1000 lb., hoisting rates of 25 and 13 ft. per min., and with 12- and 18-ft. lift heights.

Car Loader

STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., has announced a centrifugal "thrower" unit to load box cars over the top of three 20-in. doors. The loader unit is mounted on a sloping feed chute which pivots to reach all corners of the car. Throw direction is controlled by a chain operated wheel from the loading deck. The thrower can handle granular and lump bulk material to 2-in. dia. size and throws it at rates up to 80 t.p.h., by means of a high speed belt held in a concave path by two idler discs along its outside edge.

Box car loader with rated capacity of 80 t.p.h.

Heavy-Duty Air Hose

H. K. PORTER CO., INC., Quaker Rubber Corp., Div., Philadelphia, Penn., has developed a heavy-duty air hose for use in mines, quarries,

Cross-section of reinforced air hose

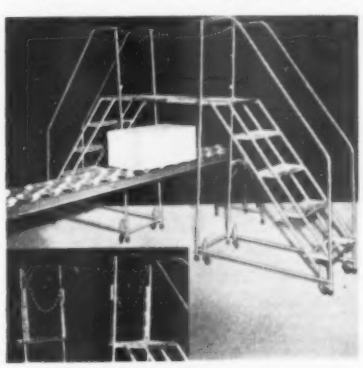
construction, etc. Horizontally braided rayon cable cord reinforcement is said to permit the Qua-Flex air hose to withstand working pressures to 450 p.s.i., and yet retain flexibility at temperatures as low as −40 deg. F. The non-porous tube is compounded of special rubber which is claimed to permit it to withstand both oil and heat and protect the carcass from abrasion and weather-checking. The air hose is available in lengths up to 50 ft., with an inside diameter of $\frac{3}{8}$ to 2 in.

Two-Way Radio Adjustment

GENERAL ELECTRIC CO., Electronics Park, Syracuse, N.Y., has started production of a frequency and modulation meter, type ST-13-A, to help maintain transmitters and receivers in two-way radio systems on their assigned frequencies. It measures modulation swing and carrier frequency of FM transmitters and features high and low RF output for receiver alignment. It is available with one or two crystals, for servicing single or two-frequency systems, in low (25-50 mc.), medium (72-76 mc.), and high (152-174 mc.) bands.

Walkway Ladders

BALLYMORE CO., Wayne, Penn., has announced production of steel ladders for use as walkways between conveyor systems. A rubber tipped leg model



Portable walkway ladder over conveyors

can be had for permanent or semi-permanent installation, while a portable model includes casters which retract automatically when pressure is applied, and anchor its rubber tipped legs to the floor. The ladders are available in standard sizes for various required heights.

Front-End Loader

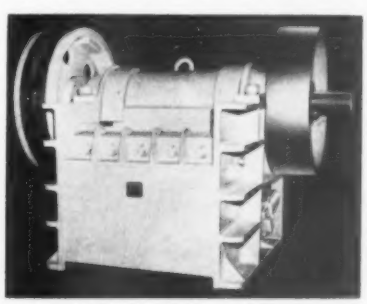
THE TRANSMISSION & GEAR CO., 10427 Haggerty, Dearborn, Mich., has introduced its model TLF-150 Transo front-end loader which has four-wheel

Loader featuring dual hydraulic cylinder

drive and a bucket capacity of 1½ cu. yd. Dual hydraulic cylinders rock the bucket into the pile to assure faster loading. Heavy-duty axle assemblies of 16 to 1 ratio, rear-mounted industrial engine, and planetary type reversing transmission are included among its features. A short wheel base and extended bucket lift and dump arms allow a 120-in. dumping position and 137-in. maximum clearance under the bucket hinge. The unit also provides a turning radius of 18 ft. at the front wheel and power steering with finger tip control of loader movements.

Jaw Crushers

GRUENDLER CRUSHER & PULVERIZER CO., 2915 N. Market St., St. Louis, Mo., has announced the "Series 10" line of jaw crushers, designed primarily for gravel and secondary crushing operations. The crushers are equipped with self-aligning roller bear-



Roller bearing jaw crusher

ings and heavy-duty manganese steel jaws and cheek plates. A Shelton patented hydraulic jaw adjustment, eliminating the wedge and screw mechanisms, is said to enable the operator to adjust the crusher, while in operation, in less than one minute.

Industrial Trucks

FORD MOTOR CO., Ford Div., P.O. Box 638, Dearborn, Mich., has introduced its 1953 line of industrial trucks. Included among the features

Heavy-duty truck with synchro-silent transmission

are one-piece, curved windshields; 5-ft. seats; counter-shock seat snubbers; 16-in. dual rear wheels; lower wheelbases; and synchro-silent transmissions which eliminate double-clutching. Fully-automatic or automatic overdrive transmissions are optional. The trucks are offered with a choice of five engines, in four lines, 20 series and in more than 190 models. Model F-900 is the heavyweight leader of the 1953 line, and is powered by an overhead valve V-8 high compression, low friction engine, with a front axle capacity of 8000 lb. and rear axle capacity of 21,000 lb. It is especially designed for heavy-duty, on-or-off-the-road work.

Variable Drive Motor

U. S. ELECTRICAL MOTORS, INC., Box 2058, Terminal Annex, Los Angeles 54, Calif., has announced the addition of Model 64 VE to its line of Varidrive motors. Model 64 VE is a horizontal assembly, 30-hp., variable-drive motor, featuring all-in-one construction which incorporates the motor, variable-speed transmission and gearing when necessary. Its features include microspeed control and indicator; splined Varidisc sheaves; double-cog Varibelts with Autotaut tension control for permanent belt adjustment; dual belt construction; and asbestos-protected motor. The drive is available with either single or double reduction gearing, and with remote controls having mechanical extensions or electric push-button stations.

Horizontal assembly, 30-hp., variable-drive motor unit

RECOVER SANDS ONCE WASTED

A. H. Smith has added new sand capacity to Branchville, Md., plant and constructs sand and gravel plant at Brandywine to supply concrete aggregates

Gravel plant at Branchville, Md. Launder to sand plant at center and left

By L. DAVID MINSK

IN SUBURBAN WASHINGTON, D.C., A. H. Smith has recently completed new additions to aggregate production facilities. The Branchville, Md., plant, the company's original, has added a 100-t.p.h. sand plant. The major effort has been put into building a new sand and gravel plant and a ready-mixed concrete plant at Brandywine, Md., southeast of Washington.

The Branchville operation consists of three separate units: crushing, gravel and sand. The crushing plant and the dredge operation were described in ROCK PRODUCTS, April, 1939, page 41. Material from the pit is put through either the sand plant or the gravel plant, depending upon the size distribution in the pit. When the gravel plant is running, waste water is sent to the sand plant. The latter was placed in service for two reasons: to recover usable sand that was being wasted, and to eliminate "pollution" of the small streams in the area. Most of the formerly wasted sand has found wide acceptance as filter sand.

A. H. Smith, right, checking quality of filter sand with Emery C. Derry, plant engineer

Sand Plant

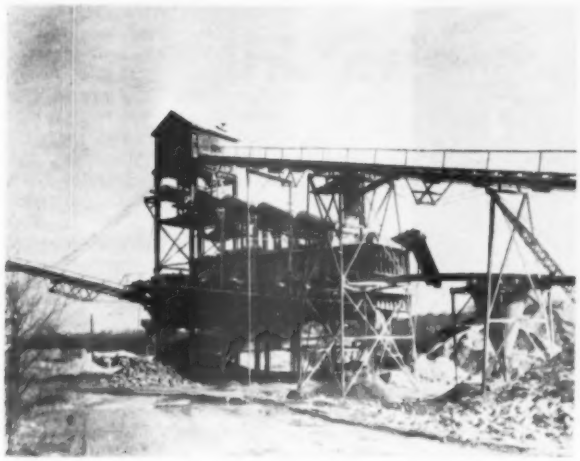
The all-steel sand plant is very compact. Space limitations confined it to a small ground area; in fact, the 24-in. belt conveyor feeding the plant from the 15-ton hopper rises at a 25-deg. angle, somewhat above the maximum recommended for elevating damp sand. However, very little slippage of material has been noticed, and no trouble is experienced. The belt conveyor is used for transporting material received from the pit into the scrubber of the sand plant. The scrubber is a 5- x 8-ft. rotary unit with a solid shell. Vanes are placed to break up any consolidated material. Fresh water is added to the scrubber at a rate of 225 g.p.m., pumped from the lake by a 3-in. Ingersoll-Rand pump. The discharge passes over a 5- x 12-ft. Ty-Rock two-deck vibrating screen. It is at this point that the waste water from the gravel plant enters the sand plant circuit.

Top deck of the screen has ¼- x 3-in. slots and bottom deck has ⅛- x 3-in. slots. Oversize from the top deck, which is a very small quantity, is carried by an 18-in. belt conveyor, 24-ft. centers, to a single-deck screen having 1¼-in. square mesh. Sizes separated by this unit are stocked in cylindrical steel bins. The plus ⅛-in. minus ¼-in. pea gravel from the bottom deck of the double-deck screen falls to a stockpile beside the plant.

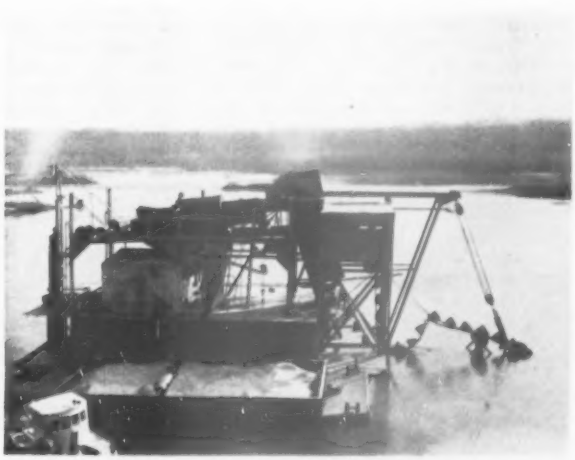
Material passing the bottom deck

Close-up of 5-ft. dia. cone classifier. Overflow is sent to the 20-ft. classifier by the split launder

VIEWS AT BRANCHVILLE AND BRANDYWINE PLANTS

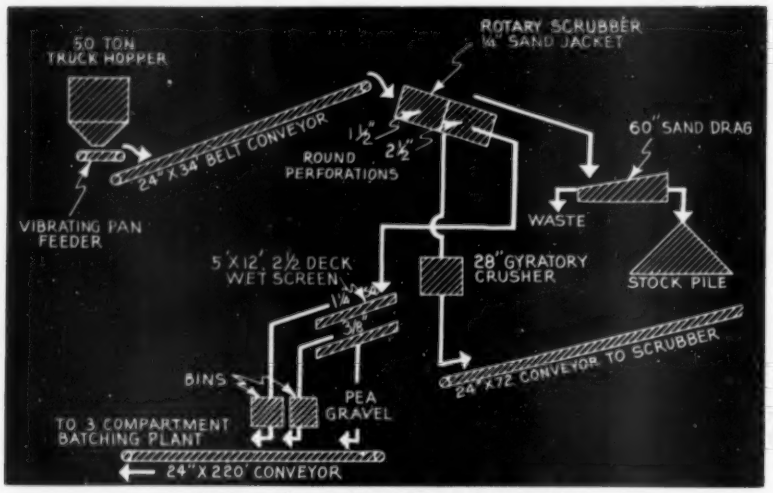


Left: Gravel plant at Branchville, showing series of conical rotary screens. Right: Close-up of sand plant with 20-ft. classifier, to the left, taking its feed from 5-ft. cone classifier, to the right, by means of split launder



Left: Sand plant at Branchville. The 20-ft. classifier is to the right. Right: Dredge operating in 80-acre lake

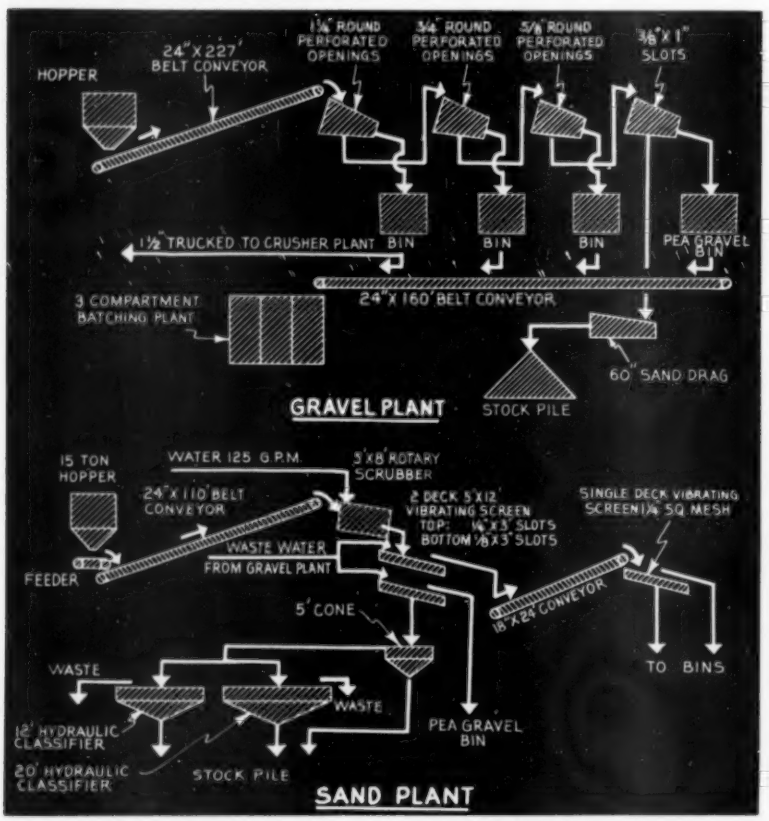
Left: Hillside location at Brandywine plant permits gravity flow. Sand and gravel plant is in the center and ready-mixed concrete plant is at the left with reclaiming belt conveyor under wooden bins. Right: View of rotary scrubber with 60-in. sand drag below and to the right



Flowsheet of sand plant at Brandywine operations

is chuted to a 5-ft. diameter cone classifier for a rough separation. Filter sand is produced by this unit; size variation is from .28 to .35 mm. Overflow from this cone is split to two Woods Auto-Vortex classifiers: a 12-ft. and a 20-ft. unit. Overflow is wasted; discharge from each is chuted to a common stockpile as concrete sand.

Waste water from the gravel plant is transported to the sand plant half way by gravity launder and the remainder of the way by pump through a 4-in. pipe line. The launder discharges tangentially into an open steel tank for separation of any large material that might clog the pipe line. An Ellicot dredge pump driven by a Masters 25-hp. motor for final transfer of waste water to the sand plant is located in a small house adjacent to the settling tank.



Flowsheet of operations at Branchville sand and gravel plants

Gravel Plant

Principal feature of the gravel plant is the series of four conical perforated screens operating on a common drive shaft. They are at this time putting in the second series of four conical perforated screens with the same perforations as the first set, operated separately from the first series, together with a 24-in. belt conveyor, 190-ft. centers, and the necessary sand-settling devices, which will give them two separate lines of screens. The separate belt conveyors feeding each set of conical screens will be in effect two separate plants operated by the one engineer. The first screen has 1¼-in. round perforations. Oversize from this unit drops to a bin and is trucked to the crushing plant when necessary. The next two screens have ¾-in. and ⅝-in. round perforations, respectively. The final screen has ⅜- x 1-in. slots. Product over the final screen is pea gravel. Material passing through this screen is sent to a 60-in. Link-Belt sand drag. This was the only sand unit in the plant before the new sand plant was built, and it couldn't handle the large volume of material. It is still used for separation of asphalt sand. Water is supplied for washing all gravel plant material by a 1000-g.p.m. American Well pump.

Bins are placed above truck-loading roadways. A 24-in. belt conveyor, 160-ft. centers, also runs under the bins for transferring material to the ready-mixed concrete plant. This is a three-compartment bin with a separate cement silo. Twenty-six truck mixers are operated.

Brandywine Plant

This plant was built to supply aggregates for ready-mixed concrete batching in an area a little too far

Three-compartment batching plant at Brandywine, Md., fed by 24-in. belt conveyor. Frame support for belt conveyor is designed to reduce side sway resulting from wind

Ready-mixed concrete batching plant at Branchville, Md.

removed from the Branchville plant. It is very simple in design, consisting of a 5- x 26-ft. rotary scrubber, gyratory crusher and two-deck screen. A hill-side location was utilized for gravity flow of materials.

Material is received from the pit in a 50-ton truck hopper and fed by a Syntron electrical feeder onto a 24-in. belt conveyor, 34-ft. centers, for transport to the Link-Belt rotary scrubber. An 8-ft. section of the scrubber is fitted with solid plate for use as a scrubbing section. Two perforated sections follow this: an outer sand jacket with ¼-in. holes, and an inner screen in two sections, one having 1¼-in. holes and the other 2½-in. holes. All material passing the inner screen is sent to a 28-in. Traylor gyratory crusher, which is in closed circuit with the rotary scrubber. Material through the scrubber is carried to the two-deck screen by belt conveyor. This screen is a 5- x 12-ft. Ty-Rock unit, operating wet. Top deck is 1¼-in. square mesh and bottom deck is ⅜ in. The three sizes produced, 1½ in., ¾ in., and pea gravel, drop into the wooden bins. Material is reclaimed from the bins and transported to the batching plant by a 24-in. belt conveyor, 220-ft. centers. A tall frame was found necessary to reduce side sway of the conveyor in the strong winds that prevail.

Sand passing the sand jacket of the scrubber falls to a 60-in. Link-Belt sand drag. A ¾-cu. yd. Koehring clamshell loads stockpiled sand into a small bin over the long belt conveyor for supplying the concrete batching plant.

The deposit is 200 acres, of which four acres are opened. Two ponds separate the opened deposit from the plant. A roadway traverses the strip of land separating the two ponds. This acts as a dam, for one pond is 6 ft. higher than the other. All waste water from the washing plant is discharged into the higher pond, which acts as a settling basin. It is periodically cleaned out and some of the material reprocessed. Clear water flows over into the lower pond, and it is from here that wash water is taken, pumped by a 6-in. Ingersoll-Rand pump at 1000 g.p.m., driven by a 50-hp. G.E. motor. The discharge pipe line is 6 in. The plant is operated entirely by electric motors. All belt conveyors are Barber-Greene, and belts are Quaker.

A. H. Smith is president of the company. The main office is at the Branchville plant. Emery C. Derry is plant engineer.

A.S.T.M. Specifications

THE AMERICAN SOCIETY FOR TESTING MATERIALS recently announced the availability of the latest edition of "A.S.T.M. Standards on Mineral Aggregates, Concrete and Nonbituminous Highway Materials." This compilation includes the latest form 93 specifications, test methods and definitions developed by several A.S.T.M. committees in this field, including committee C-9 on concrete and concrete aggregates and committee D-4 on road and paving materials.

Standards cover: aggregates, concrete, brick and block pavement materials; concrete curing materials; expansion joint fillers; and cement. Miscellaneous specifications and tests cover: aggregate for masonry mortar; inorganic aggregates for use in interior plaster; brick paving; wooden paving block for exposed pavements; and materials for soil-aggregate subbase, base and surface courses. Also included are a number of specifications and tests relating to sieve analyses. Several of the standards are either new or revised. This 307-page publication, in heavy paper cover, can be obtained from A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Penn., for $2.75 per copy.

A.S.T.M. Committee C-1 on Cement

THE DEVELOPMENT OF A SPECIFICATION for slag cement was authorized at the meeting of Committee C-1 on Cement, held in Detroit, Mich., on March 4 during A.S.T.M. Committee Week. The subcommittee on Properties of Slag Cement, after investigation and study, recognized the desirability and need for such a specification. In addition to this new development of A.S.T.M. specifications in the cement field, considerable attention was given to the existing specifications covering portland, blended, and masonry cements.

After several years as a tentative, the specification for Air-Entraining Portland Cement, C 175 T, was recommended for advancement to standard. Several changes were recommended in the Standard Specifications for Portland Cement (C 150), including a change in the maximum air content from 15 to 12 percent, a replacement of the present SO_3 requirement by a leach test and the advancement to standard of the tentative revision pertaining to fineness requirements. The sponsoring committee on masonry cement reaffirmed its previous action, recommending an autoclave test requirement in specifications C 91, with a maximum limit of 1 percent expansion at 7 days. The intention to write a specification for pozzolanic cements was reaffirmed by the sponsoring committee on blended cement, with a questionnaire to be circulated to cover conflicting points.

The use of mechanical mixing apparatus was discussed by several of the working committees, indicating a general trend toward the adoption of mechanical mixing in place of hand mixing where required in the various test methods. The coördinating committee on tests proposed a tentative method for mechanical mixing of hydraulic-cement mortars of plastic consistency, which was accepted for committee letter ballot. Two proposed test methods on strength; namely, flexural and compressive strength, as published for information in the December issue of *A.S.T.M. Bulletin*, will be reviewed through a coöperative series of tests to study the effect of mechanical mixing as compared with hand mixing. Eight laboratories will participate, using 24 cements, based on Types I, II, and V. The use of the mechanical mixer is also under way in a coöperative series, not yet completed, on a proposed bleeding test. The round-robin test series to establish the resistance of the sulfate resistance test has been completed and the results were discussed.

A revision is contemplated in the method for determining and analyzing Darex in C 114 T, involving a simplification of apparatus and stricter precautions against nitrogen contamination. Investigation is continuing on the suitability of various types of flame photometers for use in testing cement.

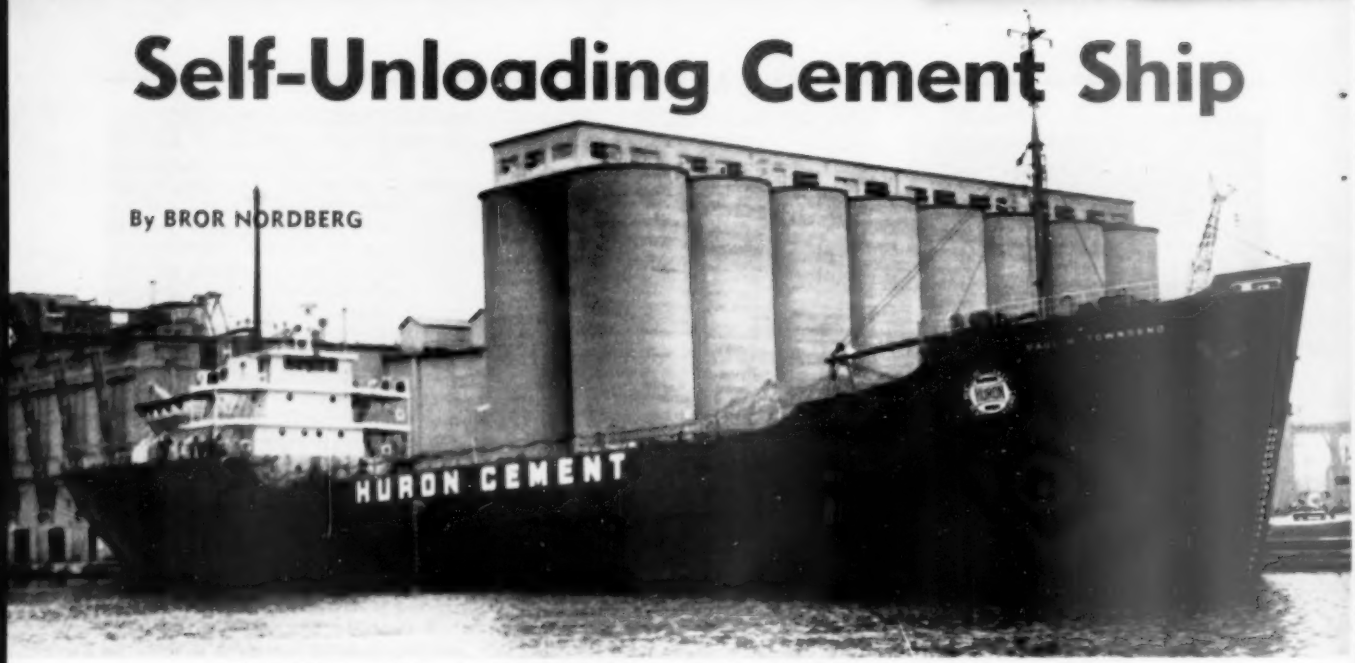
Committee C-1 will hold its next meeting during the 1953 annual meeting of the society in Atlantic City, June 29-July 3. The officers of Committee C-1 are: Chairman: R. R. Litehiser, Ohio State Highway Testing and Research Laboratory, Columbus, Ohio; secretary: W. S. Weaver, Canada Cement Co., Ltd. Montreal, Canada.

Safety Winners

SAFETY AWARDS were presented to Eastern Rock Products, Inc., Buffalo Crushed Stone Corp., Federal Portland Cement Co., and Lousville Cement Co., for their participation in the accident prevention safety contest, sponsored by the Associated Industries of New York State.

Self-Unloading Cement Ship

By BROR NORDBERG



The Paul H. Townsend moored at the dock in Alpena, Mich., for final touching up preparatory to her christening

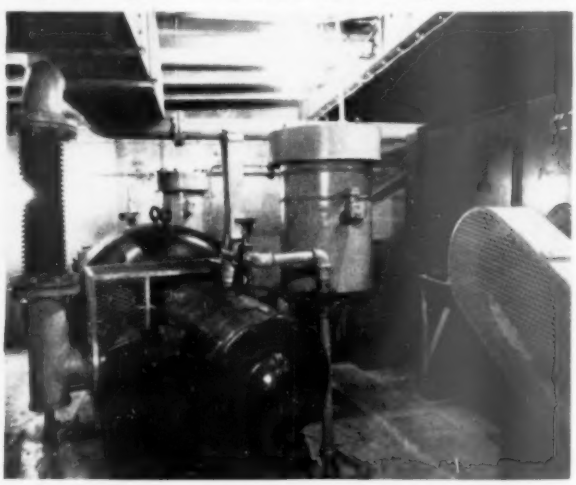
Diesel-powered, Paul H. Townsend, the fourth bulk cement carrier to be placed in service by Huron Portland Cement Co., will provide much needed transportation capacity in anticipation of a 25 percent increase in cement production

THE NEWEST ADDITION to the fleet of Huron Portland Cement Co.'s self-unloading ships, the motor vessel Paul H. Townsend, was christened at the Detroit Veteran's Memorial Building in Detroit, Mich., April 30. The Townsend was named for Paul H. Townsend, president and treasurer of the Huron Portland Cement Co. and Huron Transportation Co. Some 1200 guests of the company attended the ceremonies, which were followed by refreshments and luncheon. Then came inspection of the vessel after which the tour was extended to the general public. The company now has four self-unloading motor vessels to transport bulk cement to its 11 distributing plants on the Great Lakes.

Speakers at the christening were Emory M. Ford, chairman of the board of directors of the company, Mr. Townsend and Charles M. Adams, superintendent of plants and vessels. The sponsor was Mrs. Richard E. White, daughter of Mr. and Mrs. Townsend, who christened the vessel.

Mr. Ford commented briefly on the growing economy of the Great Lakes area and the company's expansion over the years in an endeavor to keep pace with demands. Four bulk cement carriers are now in service, he said, and, in urging all to inspect the new addition, he commented on the bulk material handling methods that make it one of the most unique vessels on the Great Lakes.

There were two factors to be considered in selecting a name for the new vessel, he said, and both were so fully met by Mr. Townsend that the board of directors had no problem in arriving at its decision. One was that the name be of a man closely recognized with Great Lakes shipping and the second was that he have an outstanding record of accomplishment in the growth of his company. Mr. Ford concluded by crediting Mr. Townsend with having a remarkable



Photos by John G. Sourts

Left: Two cement pumps which deliver cement into storage silos at distributing plants. Note Y-gates over pump hoppers. Right: Individual rotary compressors supply air to the two 10-in. cement pumps

Photos by Snuffy McGill, Royal Oak, Mich.

Celebrating christening of new ship. (1) Part of gathering of 1200 guests at the christening. (2) President Paul H. Townsend of Huron pins corsage on daughter, Mrs. Richard E. White, who christened the vessel. (3) Huron served luncheon for its guests in Detroit Veteran's Memorial Building. (4) Passing ships saluted the Paul H. Townsend. Here the Detroit fire-fighting John Kendall pays its respects. The John W. Boardman lies beyond. (5) Left to right, Lt. Richard E. White, husband of sponsor; Mrs. Paul H. Townsend; Paul H. Townsend, president and treasurer; Mrs. Ann Townsend White, sponsor; John B. Ford, vice-president; Emory M. Ford, chairman of the board with two of his children, Laura and Emory, Jr.; Mrs. William W. Crapo and Mr. Crapo, secretary. (6) Left to right: H. Ripley Schemm, vice-president-operations; Mrs. Schemm; Emory M. Ford, chairman of the board; Paul H. Townsend, president and treasurer; William W. Crapo, secretary; Mrs. Ann Townsend White, sponsor; John B. Ford, vice-president; and Lt. Richard E. White, husband of the sponsor

faculty for attracting the loyalty and affection from all with whom he is associated.

Mr. Townsend expressed his great pride and pleasure at being so closely identified with the marine industry. He was born in Cape May, N. J., within sight of the Atlantic Ocean he said, and his ancestors over a period of 250 years have depended for their livelihood on ocean trade. He left the east coast 45 years ago, he said, and, following World War I, became identified with Huron Portland Cement Co.

The festivities did not end with the christening for, the following evening, a Paul H. Townsend banquet was held as a community tribute to the Huron Portland Cement Co. under the sponsorship of the Alpena Chamber of Commerce at Alpena, Mich. About 500, including all the company's officers and their wives, were present at Alpena's Memorial Auditorium to honor Mr. Townsend and his company. Mr. Townsend was presented a large photomural showing the vessel during its first unloading trials. Entertainment included singing by the Besser male chorus, community singing and concluded with a speech by Charles P. Taft of Ohio. The Townsend was moored at the Thunder Bay Quarries Dock the following day for inspection first by Huron employes and then by the public.

A special issue of *The Alpena News*, May 1, was dedicated to the company and Mr. Townsend, carrying articles and advertisements of congratulations. These articles included a complete history of the company and its expansion. The Huron mill at Alpena is the largest in the world and is also Alpena's largest industry.

Huron Portland Cement Co. and its subsidiary, the Huron Transportation Co. of Detroit, are the pioneers in transporting bulk cement in ships to distributing plants. The mill was located at Alpena back in 1907 because of the high grade raw materials available but, with expanded operations, distribution became a problem and the solution was found in water transportation.

Originally, the mill had seven rotary kilns. A seventh was added in 1913 and the eighth in 1917. In 1916, the company developed the world's first self-unloading bulk cement carrier with the purchase and conversion of the ore carrier Samuel Mitchell. As expansion of capacity at Alpena increased by progressive stages, distributing plants were added as well as additional transportation capacity.

In 1923, the John W. Boardman was added and, four years later, the S. T. Crapo. During the 1923-1938 period, six additional rotary kilns were installed at Alpena and most of the distributing plants were built.

After World War II, heavy expansion continued. Four kilns were added in 1948 and two more in 1950. A clinker grinding plant was built at Superior, Wis., to process the output of the last two kilns installed. The company now has distributing plants at Detroit, Mich.; Cleveland, Ohio; Duluth, Minn.; Milwaukee, Wis.; Buffalo, N.Y.; Toledo, Ohio; Carrollton, Mich.; Oswego, N.Y.; Muskegon, Mich.; Green Bay, Wis.; and Superior, Wis.

Currently, the Alpena cement manufacturing plant is the largest in the world and its capacity is now being increased by an additional 25 percent. Capacity will be 26,000 bbl. per day.

Purchase and conversion of the Townsend was scheduled for the completion of the 25 percent increase in production at Alpena, which was delayed about a year due to the government's refusal to grant authority under the controlled materials plan at the time the expansion program was planned.

The Townsend was built in 1945 by the Consolidated Steel Corp. of Wilmington, Calif., as an ocean-going cargo vessel and was purchased by Huron in 1951. She was almost completely converted to a modern bulk cement carrier at Hoboken, N. J., by the Ship-building Division of Bethlehem Steel Co. and prepared for inland waterway passage.

The pilot house, bridge and boat decks had to be removed intact to clear the inland river bridges enroute to Chicago and the entire assembly was later replaced upon arrival on the Great Lakes. From Hoboken she traveled to New Orleans where she was partially buoyed on pontoons because of shallow channels in the Mississippi and Illinois Rivers enroute to Chicago. Calumet Shipyard and Drydock Co., Chicago, Ill., completed the conversion. H. C. Downer & Associates, Cleveland, Ohio, were the naval architects for the entire job.

The Townsend is powered by five diesel engines with an aggregate horsepower of 4320. A 1700-hp. diesel provides the main propulsion and top speed is 14 m.p.h. fully loaded. Two 250-kw. diesel-generators provide for auxiliary power, a 1000-kw. diesel-generator supplies power to operate the self-unloading machinery and there is a 15-kw. emergency diesel-generator. The vessel measures 339 ft. in length, 50-ft. beam and has a load draft of nearly 24 ft. Her gross tonnage is 3580 tons.

The company developed the Fuller-Huron Airslide and first put that equipment to use for unloading bulk cement from ships when the Samuel Mitchell was converted several years back. Use of airslides with highly developed electrical interlocking are

Photo by Davis Studios, Jersey City, N. J.

Left: View of the cargo hold showing the airslides for discharge of cement into longitudinal screw conveyors

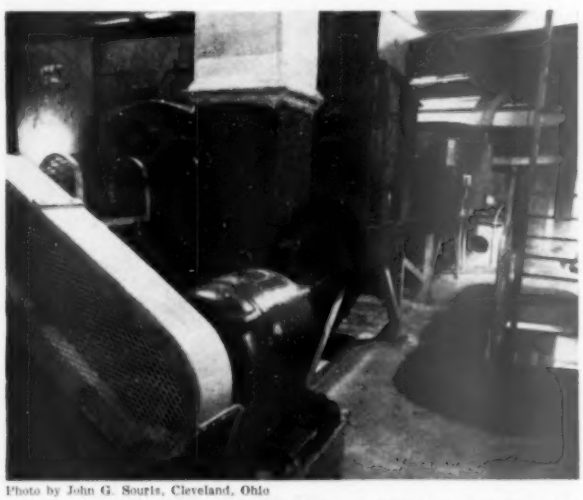


Photo by John G. Souris, Cleveland, Ohio

Right: Dust collection is accomplished by these two bag-type dust collectors on second deck

the main features of the Townsend. Use of airslides for cargo holds permits faster unloading, allows more effective room for cargo and increases vessel stability as compared to previously used methods.

The airslides, running athwartships, are on 2-ft. 3-in. center with effective canvas width of 8 in. Air is supplied the airslides by two Roots-Connersville positive displacement rotary blowers, each of which is capable of providing all the necessary air for unloading.

Cement is transferred from the airslides into two longitudinal 18-in. screw conveyors, each with a capacity of 1500 bbl. per hour. The forward and aft sections of each of the screw conveyors are really separate units, each section individually driven by a 50-hp. American Blower adjustable speed gyrol fluid drive.

Bin-dicators located on 11-ft. 3-in. centers down the entire length of each screw conveyor, working in conjunction with electrically operated valves, control the air supply to the cargo-hold airslides. Located about 3 ft. forward of each bin-dicator, on the cover of the screw conveyor, is a "schemmatic" inspection light equipped with a fluorescent tube through which the amount or condition of the feed may be observed.

The screw conveyors discharge into two 48-in. continuous bucket elevators from which the cement is fed through two 90 deg. curved airslides to two 10-in. Fuller-Kinyon type L pumps either of which could unload the ship alone. High and low level bin-dicators provide visual signals as to the height of the cement in the pump hoppers.

A 250-hp. induction motor drives each cement pump and two Fuller Duplex C-150 rotary air compressors supply the air for pump operations. Each is driven by a 200-hp. double-ended motor. Cement is pumped ashore through two 10-in. lines on either side of the vessel.

Dust collection is accomplished through the use of two Sly Dynaclone dust filters. Ventilation is provided through the use of a 20-hp. American Blower Vani-Axial fan located amidships and drawing air in from the aft tunnel and from the forward machinery space.

Unloading capacity is approximately 3000 bbl. per hour, controlled from two General Electric master stations located in the forward end of the tunnel, each station controlling the equipment on its respective side of the vessel. The entire unloading operation is completely interlocked so that the failure of any single unit will automatically shut down all other units which precede.

Unlike most Great Lakes ships, the wheel house and all quarters are located aft. The vessel is equipped with radar, television, radio, automatic pilot, ship-shore telephone, radio direction finder and gyro-compass. Her mooring winches are of the automatic tension type with remote control stations at shipside. She can be loaded with cement in five hours and unloader in ten hours. Quarters for the crew are of modern design and include hot and cold running water in the rooms and a recreation room equipped with radio, television, game tables and other recreational features.

For those unfamiliar with the operation of airslides, we refer to ROCK PRODUCTS, January, 1950, page 110, for an article describing their use in the Alpena mill and their adaptation to the Samuel Mitchell.

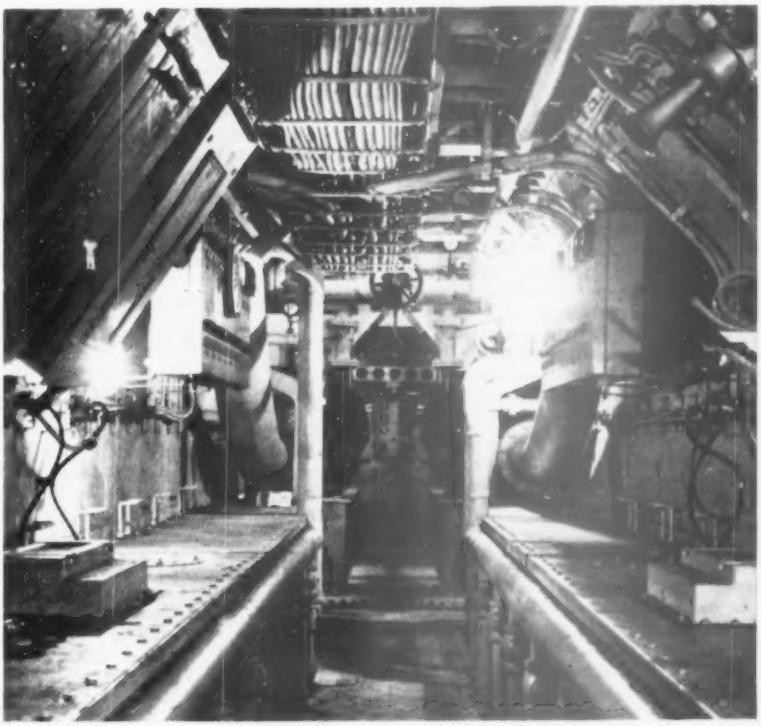


Photo by John G. Souris

Looking forward through the tunnel. On either side may be seen the longitudinal screw conveyors. Ahead are the cement pumps

Inspection of Alpha's Jamesville Plant

AN INSPECTION TOUR of Alpha Portland Cement Co.'s new cement plant at Jamesville, N.Y., near Syracuse, was recently conducted for the directors, officers and executives of the cement company and top officials of the Delaware, Lackawanna & Western Railroad Co., which services the Jamesville plant. Transportation was provided by the railway company, and a bus was chartered for the plant tour.

The new plant effects economies in the delivery of raw materials. A new shale quarry was opened and the process of manufacture was changed from a dry to a wet process plant, so as to take advantage of the moisture content of the raw materials. Capacity was increased from 1200 bbl. per day, or 430,000 bbl. per year, to 2200 bbl. per day, or 800,000 bbl. per year. The design of the new plant permits the making of cement to meet New York State Highway special cement specifications which could not be met by the cement produced in the old plant. Five types of portland cement and mortar cement can now be produced.

Due to the inability to obtain priorities on steel, heavy machinery and electrical equipment, there was a delay in completing the new plant, but it is now operating daily. A concrete road connects the plant with the county road system and the entire plant area is flood-lighted and attractively landscaped.

Officials of the company participating in the tour included the following: H. Hanks, vice-president; N. O. Wagner, assistant vice-president; K. T. Wright, secretary and treasurer; W. N. Knecht, traffic manager; J. A. Anderson, superintendent; Charles Litsinger, chief clerk of the Jamesville plant; D. L. Ziegler, eastern general superintendent; V. W. Anckaitis, engineer; and C. M. MacKain, Syracuse, sales representative. Alpha directors included: President J. F. Magee; Vice-presidents Robert S. Gerstell and J. D. McKelvy; and G. S. Brown, J. J. Matthes, Morris R. Williams, Vermont Hatch, Samuel G. Baker and John H. McCune, Jr.

AGRICULTURAL LIMESTONE
A Necessity for Economical Production

By E. R. COLLINS*

AGRICULTURAL LIMESTONE is applied to soils to neutralize soil acidity and to furnish calcium and magnesium. As an example of how farmers are overlooking the need for liming materials, 53 percent of the tobacco soils sent into the soil testing laboratory during the period July 1, 1949 to June 30, 1950 were below pH 5.6. The optimum range for this crop is 5.2 to 6.0. Peanuts is a crop requiring large amounts of calcium, yet 74 percent of the soils tested 6.0 or below. Cotton also requires large amounts of calcium, yet 43 percent of the soil samples submitted were below 5.6.

The North Carolina Experiment Station results show that when one ton of liming material was applied to a soil with a pH of 5.0 for cotton, the return above the cost of the material was $66 per acre. The return per dollar spent was $55.87. Two tons of liming material per acre applied on a soil of pH 4.2 increased the value of the soybeans, above the cost of the material, $24 per acre. This was a return of $6.95 for each dollar spent. Two tons of liming material applied to a soil for Ladino clover increased the value of the crop $49 above the cost of liming material. This was a return of $17.48 for each dollar spent for liming material.

In an average of nine soybean experiments, 400 lb. of 0-10-20 fertilizer per acre increased the value of the soybeans $7 above the cost of the fertilizer. When the soil was limed and fertilized with 400 lb. of an 0-10-20, the value of the crop was $26 above the cost of the liming material and fertilizer. In the latter case, the return per dollar spent for fertilizer was $4.16.

These results would indicate that there are many soils in North Carolina which would give large returns from the application of liming material. These returns per dollar spent for fertilizer or liming material, are generally larger in the case of liming material than for fertilizer. In spite of this fact, in the 1951-1952 fertilizer season, North Carolina farmers used only 531,364 tons of liming material, but used 1,902,172 tons of mixed fertilizers and fertilizer materials.

The need for liming material is easily determined by a soil test, and this is a free service offered by the soil testing division of the North Carolina Department of Agriculture. Every farmer should take advantage of this opportunity to increase his income, for relatively little cost, by having a soil test made and applying the liming material which is needed for the crops to be grown.

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Moving Sand Hydraulically

TAYLOR SAND CO., for the past eight years, has been carrying on extensive sand-excavating operations on a large sand deposit near Junction City, Ga., which displaces the red clay soil formation common to most of the state.

The company removes the sand hydraulically, utilizing a series of diesel-powered pumps which provide water for breaking down the material in the pit, to a pulp, to be pumped to the loading dock. The excess water is returned by the flume to the lake from which it is pumped. Production is in the 200-t.p.h. range. Only ten men are required for the entire operation.

Water is first taken from the lake by an 8- x 10- Gardner-Denver pump and pumped a quarter of a mile to the deposit. A 6-in. Pekor pump draws up the sand and water and delivers the pulp to the separators which are 900 ft. distant. The sand is then discharged into bins where a stream of water carries the pulp to another pump which moves the material to a final washer from which it is chuted into railroad cars.

The three pumps used by the company are powered by General Motors 2-cycle diesel engines, engineered to the job by Blalock Machinery & Equipment Co., Atlanta, Ga. The plant is owned and operated by Steve E. Taylor, also of Atlanta.

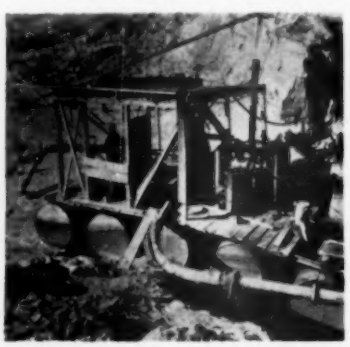
Price-Fixing Indictment

A FEDERAL GRAND JURY has indicted four large eastern sand and gravel companies on price-fixing charges. The indictment also named a trade association and three individual company officials. The indictment charged the defendants with "conspiracy to fix, establish, and maintain uniform and non-competitive prices, discounts, terms and conditions for the sale of sand and gravel." The government charged that the defendants engaged in price-fixing activities in 48 counties in Pennsylvania, Ohio and West Virginia from 1941 until the present time. The government also charged that the defendants used "agreed-upon prices in connection with both U.S. government projects and state projects with actual knowledge that those projects were financed in whole or in part by the U.S. government."

Those involved in the indictment are Western Pennsylvania Sand and Gravel Association; J. K. Davison and Brother and its president, George M. Davison; McCrady-Rodgers Co. and its first vice-president, Howard McCrady; Iron City Sand and Gravel Corp. and its chairman, W. S. Giles; and Dravo Corp.

Wallboard Panels

U.S. GYPSUM CO., Chicago, Ill., is now commercially producing a new type wallboard, designed primarily for use by the home "handyman." Instead of the usual large sheetrock sizes, these panels are only 16 in. wide and 8-10 ft. long, and are applied to a wall by placing parallel ridges of adhesive to each panel, and pressing. No nails are said to be needed. The panels have rounded edges and are available in plain or knotty pine finish, or in a striated design. They are also claimed to be strong, fire-resistant and easy to handle, even in corners, because they can be scored with a pen-knife and split by hand pressure alone.



Left: Water under high pressure dislodges sand from the walls of the deposit and floats it to a second pump. Center: Sand and water, washed down by the hydraulic operation, are picked up by the second pump and pumped 900 ft. to a separator. Right: Graded sand in bins is floated to a third pump which pumps the material 200 ft. to final washer from which it is chuted into railroad cars

PROSPECTIVE CHEMISTRY

of Cement and Concrete

By NATHAN C. ROCKWOOD

Part VII. Chemical analysis of silicate rocks do not identify qualities for concrete aggregates

THE PRECEDING TWO ARTICLES on structure of silicates prove that merely to designate certain rocks, gravel or sand aggregates as composed of, or contaminated with, minerals described as "silicates of potassium, aluminum, calcium, sodium, magnesium, iron," etc. is not enough to provide any accurate indication of their possible qualities as concrete aggregates. It follows, therefore, that a mere chemical analysis is not conclusive, although it may be helpful in determining the mineral species. The important things are the constituent minerals themselves, whether they contain water molecules, OH ions, one-, two- or three-dimensional silicate lattice structures, how these minerals are distributed in the rock, grain size, cementing and packing of crystals, etc.

Chemical analyses of rocks, gravel and sand (and of portland cement clinker, too) may be actually misleading. For example, the components are usually reported as SiO_2, Al_2O_3, CaO, etc. In the discussion in previous articles on the structure of the silicate minerals it was shown that in the feldspars, for example, the element aluminum never occurs as Al_2O_3, but as AlO_4; moreover, SiO_2 does not occur as such but as SiO_4. Judging by the physical and structural characteristics of a feldspar as compared with those of the amphiboles and pyroxenes, which may have very similar chemical analyses, vastly different results can be expected in their service as concrete aggregates. Feldspars are tectosilicates and have three-dimensional lattice structures which make for hardness, toughness and durability, while the amphiboles and pyroxenes are insosilicates with two-dimensional (chain) lattice structures, or they are feldspar minerals that have already begun to disintegrate. In them the aluminum may no longer be four coördinated as a part of the Si- or Al-O_4 three-dimensional structure, but probably most of it is more loosely held in six-coordination to its accompanying oxygen ions. The chemical analysis given as Al_2O_3 does not show this difference although chemically correct.

Al_2O_3 Not Harmful

The mineral truly defined as Al_2O_3 is corundum, which is harder, tougher and more refractory than quartz (SiO_2); it has a three-dimensional lattice and is something like quartz in other respects. Its structure is described as closely packed oxygen ions in tetrahedral organizations with the aluminum ions in the tetrahedral holes, and the oxygen ions of one layer are so superimposed on the one below that each aluminum ion is surrounded by six oxygen ions; and the bonds are at least partly co-valent, like those of silica. Fig. 1, herewith, is reproduced from the article in our August, 1952, issue in which the general idea of the Al_2O_3 structure was described. As in the SiO_2 structure, every oxygen ion is between two aluminum ions, so that the oxygen ions on the fringes or outer surface of the particles are reactive ions, each with an unsatisfied negative charge or receptive to one valence electron. Hence a colloidal particle of alumina (Al_2O_3), like a colloidal particle of silica, generally acts as an acid radical and will readily react chemically with (or adsorb) positively charged ions (cations) such as sodium, potassium, calcium, etc. However, having relatively fewer oxygen ions exposed per particle, as compared with the silica tetrahedra, it is not so strongly acid and under some conditions forms an hydroxide radical, or it is said to be amphoteric.

From the foregoing description it may be concluded the Al_2O_3 as such is not a detrimental impurity in concrete aggregate. It does occur in both igneous and sedimentary rocks such as limestone, but ordinarily not in appreciable amounts like some of the deleterious clay minerals. Hence, when an analyses of a limestone shows a certain percentage of Al_2O_3, it is probable that most of the aluminum is present not as Al_2O_3 but as one of the clay minerals, which have entirely different structures and properties. So we find concrete researchers attempting to draw a line between clays which expand on wetting and those that do not. The line is there all right, and the difference is fundamental, and perhaps may be readily understood even by the layman who can visualize these structural differences.

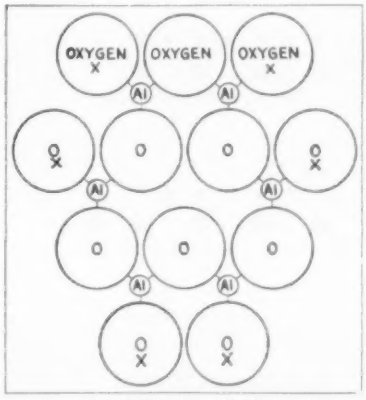


Fig. 1: Structure of Al_2O_3

Expanding Clay Minerals

The clay minerals which expand extraordinarily, unlike quartz and alumina, are not three-dimensional lattice structures. There are usually two-dimensional sheets or plates, which made up into three dimensional particles have only H_2O, OH, or at best a soluble alkali ion like sodium or potassium, to bind the plates together. If the binding cations happen to be calcium, aluminum, magnesium, etc., which are not so easily soluble, the clay particles are less subject to expansion and contraction from wetting and drying because it would first require breaking these bonds. Of course, raw clay minerals are not purposely incorporated in concrete. They may get into it as coatings on aggregate particles or as ingredients in sedimentary rock aggregates such as limestones.

The most important clay minerals—those that give clays their special properties—are hydrolyzates. They are assumed to be the end results of ionic (chemical) solution of the minerals in feldspar-containing rocks. They have been shown to be tiny flat crystals or precipitates of newly formed (secondary) minerals. Technically they are phyllosilicates or two-dimensional leaf structures. They are so small that many are of colloidal size. Clays also contain some undissolved residual mineral particles of quartz, feldspar, etc. that have resisted weathering and disintegration. The fact that the particles are so small makes the identification of these minerals very difficult, yet it is important to know the real nature of the clay particles if the fundamental causes for certain defects in some concrete aggregates are to be accounted for. Why, for example, are some

limestones, containing say 8 or 10 percent or more of argillaceous impurities, good aggregates, and others with the same percentages, bad aggregates?

How Limestone is Formed

To answer this question it is probably best to start with a brief description of the formation of the limestone. We use limestone as an example because it is the most commonly used for concrete aggregate. The same line of reasoning would apply to any other sedimentary rock such as sandstone. The most important limestone deposits are probably formed of calcium carbonate particles or sediments derived from the breaking up of shells and skeletons of marine organisms. It is true that some are derived by precipitation of calcium carbonate from bicarbonate solutions, and probably most limestones are formed in some degree by both processes, the shell fragments being cemented together by precipitated calcium carbonate. Limestone deposits therefore start from marine sediments deposited under water.

In the formation of these beds of sediment it is plain that local conditions existing at the time of deposition will control the nature of the deposit and of the subsequent solidified rock. That is, in deposits near the source of the raw material, or in waters subject to currents or turbulence, the particles of calcium carbonate sediment that settle down will tend to be relatively large and clean, just as the products of various sand-washing and settling devices separate and clean different sizes of sand. Such deposits are probably sources of good aggregate for several reasons: (a) grain size is relatively large and hence pore space is of relatively large dimensions; (b) they contain a minimum of impurities or foreign sediments; (c) the cementing material between grains is probably entirely or very largely calcium carbonate material.

Suppose now that the calcium carbonate sediment was deposited near the mouth of a river bringing down considerable amounts of sediments derived from the disintegration of feldspar rocks—in other words clay minerals, or solutions which formed clay minerals when precipitated by the salt water at the mouth of the river or lagoon. The clay mineral sediments would then become hopelessly mixed with the calcium carbonate sediments in the bay or lagoon, and the two would be deposited as an intimate mixture, later to be consolidated as an "argillaceous limestone." In this manner it would be possible to have a limestone with an appreciable percentage of "expanding" clay particles which is an entirely satisfactory concrete aggregate, provided that most of the binding material is calcium carbonate and not clay. The reactive (with moisture) clay particles would be so well distributed, or each particle so isolated, or insulated, that whatever small expansion took place if water did reach it, would be absorbed in the surrounding pore space. The phenomena connected with hydration of these particles are probably something like what takes place when a reactive silica aggregate is so finely divided and distributed as to become a pozzolan, which not only cures the ills of cement-alkali-aggregate reaction, but obviously improves the concrete through distributing and diluting the reaction throughout the mass, where it does the most good in supplying cementing material and for pore sealing.

Consider now a case where a river or land spillway delivers sediment only at regular or irregular time intervals, while the calcium carbonate sediment is being continuously deposited, or possibly deposited at intervals when the water is clear of land sediments. We would then have the calcium carbonate sediment and the clay minerals sediments deposited in separate layers, one on top of the other. The clay sediments would thus be concentrated, and while constituting no larger a percentage of the whole deposit, or stratum, the effects on aggregates including these layers or bands of clay might be highly deleterious. These deleterious results would be enhanced if the waters of the lagoon where the deposits take place were still and stagnant, because these conditions make for deposition of finer fragments of carbonate and the formation of some of the worst-acting kind of clay minerals. In other words, a fine-grained, laminated limestone would be formed. One of the worst-acting coarse aggregates in Indiana is just this kind of a limestone. Thus, a fine-grained argillaceous limestone with expanding clay in concentrated layers, bands or pockets is bound to make a bad aggregate for it will undergo volume change in these clay bands from wetting and drying. It should go without saying that in deep-bedded limestones these clay laminations are converted into shale, which may be just as troublesome.

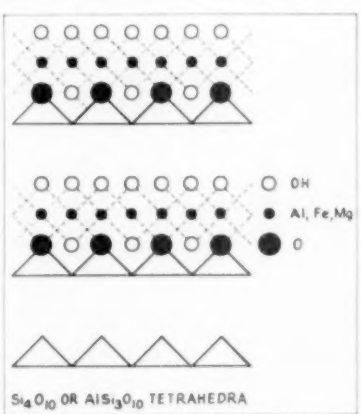


Fig. 2: Schematic structure of kaolinite

Structures of Clay Minerals

Here is about the place to explain the chemical structure of the clay minerals, an understanding of which should prove a big help in unraveling some of the mysteries of why certain aggregates are bad actors and others are not. The clay minerals are divided into eight groups as follows: Kaolinite; montmorillonite; balloysite; illite; magnesium rich; allophanes; chlorite mica; oxides and hydroxides. The first four are primarily hydrous aluminum-silicates. They may contain various amounts of magnesium, calcium and iron. These four are the ones we are primarily interested in, and their chemical formulas are rather involved, such, for example, as that for montmorillonite—$Al_2[(OH)_2 \mid Si_4O_{10}] n H_2O$. The part of this formula within the bracket has six unused negative charges—$(OH)_2 + O_2 = 2 + 4$—which the Al_2 with six positive charges balances. Included is a varying amount of water—nH_2O—which is not chemically bound as can be seen in Fig. 3.

Kaolinite is the most stable of the clay minerals, and its presence in a concrete aggregate does not appear to cause trouble; it is not ordinarily considered an "expanding" clay. A reason for its relative stability may be found in its structure as represented schematically in Fig. 2. Both Fig. 2 and Fig. 3 are adapted from sketches in the recent volume "Geochemistry," by Rankama and Sahama, reviewed in "Rocky's Notes," in our issue of February, 1951. It will be noted that the plates formed of Si_4O_{10} or $AlSi_3O_{10}$ tetrahedra in kaolinite are bonded together by OH ions—a weak ionic bond but nevertheless better than none—the O's of the tetrahedra in the case of those of silica have some unused negative charges and these presumably latch on to the H's or the positive poles of the OH ions, the O part of the same ion forming one of the six O ions surrounding or coördinated with the aluminum ion. Where the tetrahedra are AlO_4 there is an extra O to be taken care of, and it is of course necessary to introduce compensating positive ions, to neutralize the ionic lattice structure, and that is where magnesium, calcium or similar "impuritiy" comes into the picture.

Montmorillonite

Now compare Fig. 3, which represents the lattice structure of montmorillonite, with Fig. 2. We have the same kind of plate structure of the SiO_4 and AlO_4 tetrahedra, but there are no binder ions between these plates. There is a film of indefinite thickness of water molecules. The plates of tetrahedra consequently open and close like an accordion depending on the amount of moisture in this

film, or as they say, according to the vapor tension between the plates. Thus when montmorillonite is heated, vapor tension is increased and the plates are drawn together. When more water or water vapor enters, some of the tension is released and the plates spread apart. This phenomena has been illustrated in the case of the Indiana limestone already referred to. It so happens that these particular montmorillonite laminations, some only the width of a pencil line, are dark colored and can be plainly seen. Such color may be due to carbonaceous matter or to ferro-magnesium minerals included in the clay. In many cases, probably there are no differences in color, and visual examination of a piece of rock would not show any such laminations; but they would be there just the same. The essential physical difference between the calcium carbonate laminations and the clay laminations is proved in this Indiana rock by the water absorption ratio. Moisture penetrates very slowly through the calcium carbonate at right angles to the laminations, but if a sample is stood on end so that the laminations are vertical, moisture travels up through the clay very rapidly, causing expansion at right angles to these clay laminations. There is, of course, a minimum of resistance to freezing and thawing, or to such tests as those of sodium sulphate or magnesium sulphate solutions, and wetting and drying.

Water in Montmorillonite

It is quite possible that in the case of the innermost film of water attached to the SiO_4 or $AlSi_3O_{10}$ tetrahedra, these water molecules are oriented, since water molecules are dipolar—that is, one or both H ions of the water molecule are attracted by the negative charges on the base O ions of the silica tetrahedra. This probably is also the way a single molecular film of moisture is attached to the pores and interior channels in cement gel. In other words the molecules of water are in effect standing on end, which would account for the greater than ordinary density of this water, which has been found by experiment. However, the big gap between plates of montmorillonite (about 15Å) shows that most of the water or moisture is not thus chemically bound. A difference in the way the plates of tetrahedra in Fig. 2 and Fig. 3 face each other will also be noted. In the case of kaolinite the OH ions sort of interlock with the O ions of the bases of the tetrahedra above, and the distance between the plates is less. It will also be noted that each of the metal ions, Al, Fe or Mg, as the case may be, are 6-coördinated with either OH or O ions (the bonds being represented by dotted lines). It should be added that the structures of clay minerals are

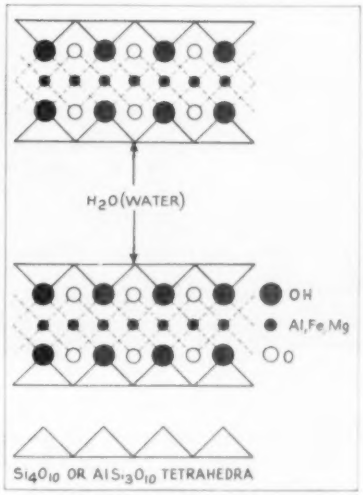


Fig. 3: Schematic structure of montmorillonite

still not adequately known, but a great deal of research has been done recently and is still going on directed to this end. It is only a natural conclusion that some of this research and the methods employed in it, could be made of much value in research on cement, aggregates and concrete.

Closely allied to montmorillonite are such clay minerals as beidellite and montronite, which have similar structures and are of the expanding type. Beidellite has been recognized in concrete literature as a bad actor when present in limestones. The illite group more nearly resembles the structure of mica where the plates are bonded together by potassium, iron, magnesium, calcium, etc. The weakness of these bonds is shown by the ease with which the plates are separated, but since appreciable energy is required to do this, the bonds are obviously of some value. Clays of this character would not necessarily be deleterious in concrete, because the residual liquids in concrete are probably strongly alkaline for many years after hardening of the concrete, and such bonds would not be so easily dissolved in alkaline solutions as in solutions of lower pH (more acid) such as found in nature. Moreover, such ion exchange as would take place might possibly have the effect of replacing soluble ions of sodium or potassium with di-valent calcium or magnesium ions from the cement gel or aggregate. Studies of reactions within concrete, it would seem, should always be related to the environment of the aggregates—that is ordinarily they are certainly surrounded by alkaline solutions and predominantly basic minerals would not be readily attacked.

Comments

The foregoing is not presented to insinuate that the writer has any expert knowledge of the subject, even though some statements may seem of a more positive character than warranted. Any layman with some elementary knowledge of physics and chemistry, as it is presumed all engineers have, can learn as much with a little concentrated reading of the latest text-books. The writer has in mind only to call attention to some important lines of recent geochemical research that seem to be largely overlooked by many cement and concrete researchers. Our perhaps somewhat unkind strictures on the activities of typical engineer researchers in the March issue of ROCK PRODUCTS were caused chiefly by listening to the constant repetition of experiments and experience which have already develoed a tremendous volume of largely unread literature. Some of this is consistent and merely emphasizes facts that have long been well established but never adequately explained. The excuse for the many inconsistent results is almost invariably that one is dealing with so many diverse factors at the same time that observations and conclusions can never be safely drawn in regard to any one of these. Our belief is that probably it will eventually be shown that many effects which are now deemed different phenomena or reactions are actually merely manifestations of some very few fundamental natural laws of chemistry and physics.

Correction

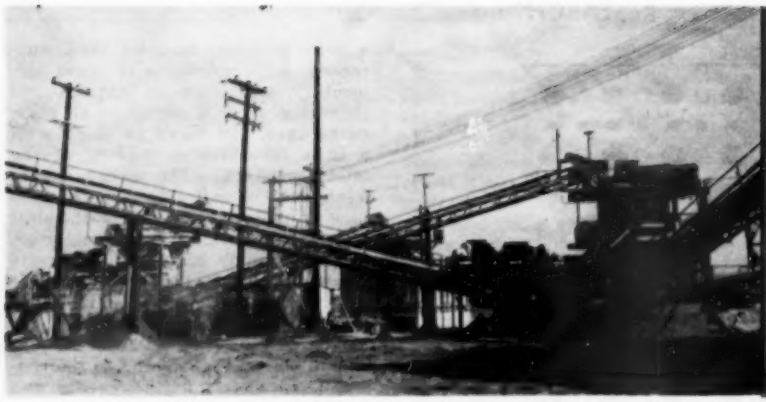
In the article on the structure of feldspars in our March issue, p. 112, in the middle paragraph of the second column, where we are emphasizing the importance of the silicon (Si) ratio to aluminum (Al), the wording in two places is inadvertently printed as *silica* to aluminum ratio. Obviously, since we were comparing the chemical formulas, the Si to Al ratio was intended, as we presume really interested readers concluded. Further along "the silica to alumina ratio" is referred to. This also should be *silicon* to *aluminum*.

Safety Awards

VALLEY DOLOMITE CORP., Bonne Terre, Mo., recently held its annual safety award ceremony. Individual prizes were awarded to men in various departments having no lost-time accidents during the four, quarterly, safety programs. Other awards were on a departmental level and were presented on the quarter-year basis. The safety programs are the result of the plant safety committee, made up of men from each department, and set up as a joint effort of the union and company to provide safe working conditions.

Buys Gravel Plant

MUSKINGUM RIVER GRAVEL CO., Zanesville, Ohio, has purchased the plant and assets of Granite Sand & Gravel Co., also of Zanesville.



H. G. Fenton Material Co., San Diego, Calif., rebuilds Otay No. 1 plant, adding crushing, scrubbing and sand recovery equipment. Company is large producer of ready-mixed concrete

Primary crusher, to the left; scrubber, screens and sand drags, to the right

MECHANIZE to Improve Quality

By WALTER B. LENHART

ONE OF THE FASTEST GROWING SECTIONS of southern California is the area surrounding San Diego. From Oceanside, which is about 30 miles north of San Diego and down the coast almost to the Mexican border, new construction of all kinds has helped make the past year very productive for the sand and gravel producers who serve it. The military has accounted for much of the work. At San Diego and within its suburbs, the navy, air force, army, coast guard, and marine corps all have effective and large establishments and there seems to be no end to their growth. The ideal climate has helped to swell the building of private homes and similar structures. New highway construction in the area also has helped to increase business.

This steady and continued construction work is having its effect upon the sources of sand and gravel. Depletion is a term that is beginning to have a real meaning in the area.

Primary jaw crusher

This may appear strange to one who drives through the area, as practically every highway cut shows high banks of what appears to be gravel, but a great portion of the material is a partially cemented conglomerate. Isolated islands here and there of workable and acceptable gravel are being worked, but for a considerable distance from metropolitan areas there is a type of conglomerate that slacks or breaks down completely on wetting and standing a day or two. In other beds, and these are quite widespread, the sand and gravel breaks down only in part on wetting and standing, say 48 hr. Thereafter this type of material continues to disintegrate a little each day so that material processed one day may a week or even a month later have a lot of particles in it that progressively slack and become powder-like in appearance.

Crushing to small size does not solve the problem, for even the sand will disintegrate on standing. One sand revealed that when first processed it would have around 3 percent minus 200-mesh material. After a week, the minus 200 was nearer 7 to 8 percent, and after a month or more the sand had as high as 20 percent minus 200 mesh in it. This indicated that even the sand was a conglomerate material, or contained particles that on wetting and standing would turn into a powder. This type of material is a challenge to the sand and gravel operator, and some are thinking in terms of heavy-media separation with the hope that when the time comes these partially cemented conglomerates can be adequately processed. In other sections, clay lenses and seams cause trouble, and each day deposits are being worked that progressively become more and more troublesome to handle, and deposits formerly worked many years ago are being reopened.

One of the transit-mixer trucks

One such deposit that is being reworked is that of H. G. Fenton Material Co. at Otay No. 1. Otay No. 1 is located close to a drainage system that runs east to west, some ten miles south of San Diego. It is an old productive area and H. G. Fenton Material Co. had a plant there some years ago, but practically abandoned the pit to work what appeared to be

Batching plant for ready-mixed concrete

a better one to the west of Otay No. 1. Sand and gravel from the reopened deposit is of the highest grade and ranks with the best in the San Diego area. It is said that concrete made from this material requires one-half sack less of portland cement per yard to obtain strengths equivalent to the higher ratio of cement used with other San Diego gravels. There are other producers of large capacity in the same drainage area. However, because of depletion, the company last year returned to Otay No. 1 and rebuilt the plant which is near Palm City and close to important highways serving the southern tip of California.

Sand Recovery

When the plant first went into operation tilted-type sand wheels were used, but these proved inadequate to make a clean sand and to recover needed fines so they are not in use. Instead two company-made sand drags were installed. These use a 30-in. belt with 36-in. length angle-iron flights spaced on 12-in. centers. The tail pulley is 40-in. dia. Each unit is driven from the head pulley by a 15-hp. Sterling gear-head motor. The speed of the units helps to maintain the proper amount of turbulence to lift out the clay and still retain the proper sand gradations. These units run possibly 10 to 20 percent faster in feet per minute than most drags of this type.

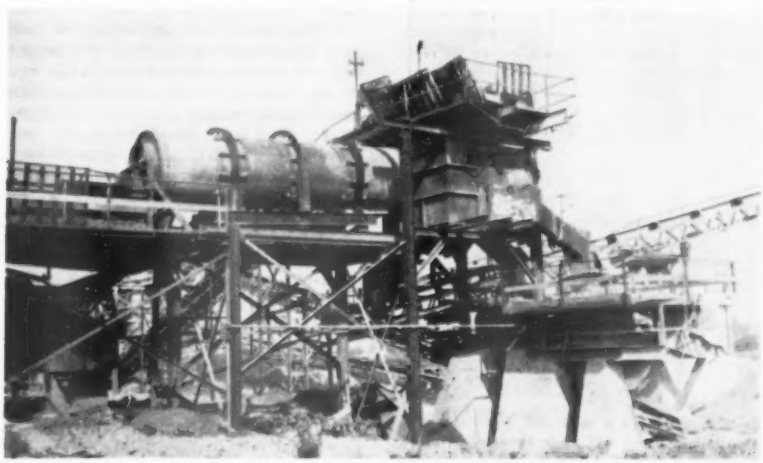
On the wet side of the plant, a 6- x 24-ft. Madsen rotary scrubber is used. The primary crusher is a 15- x 28- Pacific jaw with a 3-ft. and a 4-ft. standard Symons cone crusher for final reduction. The scalper screen following the scrubber is a 4- x 10-ft. Symons. The dry plant includes a 42-in. x 12-ft. and a 4- x 10-ft. Symons vibrating screen.

The plant uses belt conveyors throughout with ground-stored material reclaimed via tunnels. All conveyors are driven through U.S. gear-head motors with American and Hewitt-Robins belts in use. At Otay No. 1 the company has a neat ready-mixed concrete batching plant, operating under the name of Pre-Mixed Concrete Co., using Noble weigh batchers augmented by a Blaw-Knox silo for bulk cement. Challenge truck mixers are mounted on F-7 and F-8 Ford chassis, which are being standardized for use in this type of work.

Trucking accounts for most of the sand and gravel shipments. A set of 70-ft. Webb truck scales are used. The plant has a capacity in the 200- to 250-t.p.h. range. Water is obtained with a 1000-g.p.m. Layne and Bowler deep-well pump. Loading in the pit is done with a 1½-cu. yd. Northwest dragline, with truck hauling to the truck hopper serving the plant.

Offices of H. G. Fenton Materials Co. are in San Diego. L. H. Hunte is president of the company. A. E. Lejonhud is vice-president and general manager; D. O. Lockman is secretary and treasurer; and Ted Barnes is superintendent at Otay No. 1.

Sand drags have replaced sand wheels. To the right, above, may be seen vibrating screen at the end of scrubber



Close-up of 6- x 24-ft. scrubber with a scalper screen ahead of scrubber

California Talc

THE JULY, 1952, ISSUE of *California Journal of Mines and Geology*, published by the California State Department of Natural Resources, Division of Mines, contains an article by Richard S. Lamar, technical director, Sierra Talc and Clay Co., Los Angeles, describing the use of California talc in the paint industry. Newly developed ultra-fine talcs, having particle sizes of less than one micron, are finding application in enamels, lacquers and other paints for exterior use. By 1946, the West Coast paint industry was using talc as an extender pigment at the rate of 29,000,000 lb. annually. Another factor contributing to the growth of the talc industry was said to be the increased use of talc in ceramics, especially floor and wall tile.

The talc-producing centers of California are located in the desert areas of San Bernardino and Inyo counties. Three mines in these localities have been in continuous operation since 1917 and have produced more than 20,000 tons of crude talc each. Numerous others have been put into operation more recently. In 1939, approximately 35,000 short tons of talc were produced; by 1947, this had increased to over 80,000 short tons; and in 1950, over 100,000 tons were produced. Prices of ground and bagged talc range from approximately $20 per ton (f.o.b. the grinding plant) for the poorer grades to as much as $80 per ton for the ultra-fine grinds of high quality paint talcs.

Other topics discussed in the article include: "Modern Trends in Paint Formulation"; "Characteristics of Extenders"; "Uses of Talc as an Extender Pigment in Paint"; and "Chemical and Phyiscal Properties of Paint Talc." Also included are several illustrations, tables and charts.

GRINDING BALL CLASSIFICATION

Its Effect on Capacity and Ball Migration

By C. MacARTHUR CARMAN*

THE BASIC OBJECTIVE OF GRINDING, or milling, is the reduction of a given material, or mixture of materials, to a specified finished size gradation at the maximum rate, accompanied by minimum use of power and labor; minimum expense for operating and repair supplies; and with the minimum capital investment.

These objectives are subject to the influence of many factors. Most important influencing factors are as follows:

1. Type of material, its grindability and other characteristics affecting its reduction.
2. Maximum size of material in feed.
3. Size gradation of the feed, and in the circulating load when in closed circuit.
4. Moisture content of feed material.
5. Temperature of feed materials.
6. Rate of feed.
7. Uniformity of feed.
8. Control and dissipation of heat generated in mill.
9. Size and gradation of finished product.
10. Type of grinding unit.
11. Dimensions of grinding unit.
12. Type and dimensions of mill lining.
13. Speed of rotation of grinding unit.
14. Quantity of grinding media.
15. Size of grinding media.
16. Location of each size of grinding media in mill.
17. Type of circuit.

The effect upon grinding efficiency of each of these factors has been the subject of countless tests and experiments, and the results of the most important of these investigations have been made available to the portland cement and mining industries in many ways. There is fairly general agreement concerning the best methods of controlling each of these factors, and of maintaining that control. It is not the intention to discuss all the factors here. Instead, this article will be confined to a discussion of the effect upon grinding mill capacity and grinding ball migration resulting from improved grinding-ball classification.

While many working rules have been established covering grinding operations, some of which relate to grinding media and ball classification, there has been no satisfactory way brought out to insure that the correct sizes of grinding balls will be correctly located in a tube mill, and in sufficient numbers, to go to work on each size of material as it is reduced during its passage through the mill.

It is logical to believe that there would be an increase in capacity, and in grinding efficiency, accompanied by a decrease in the consumption of power per ton of material ground if the ball charge in a ball or tube mill could be so arranged that the diameters of the grinding balls would diminish at a uniform rate toward the discharge end of the mill. In such an ideal ball charge there would be an ever-increasing number of smaller and smaller balls where needed to reduce the number of smaller and smaller particles of the material as it moves through the mill from the feed end to the discharge end. Although this condition is known to be highly desirable, it has never until recently been attained in commercial tube mills suitable for use in the portland cement industry, except perhaps in a very short ball mill.

Those who have made tests of cylindrical ball or tube mills carrying multi-diameter ball charges are familiar with the fact that, while there is often a fair intermixing of balls of various diameters throughout the length of the mill or compartment, there is always evidence of the larger balls migrating toward the discharge end and remaining there where they are not intended to be.

The results of such a test in a commercial tube mill have been plotted as Curve *A*, in Exhibit A. It will be noted that the larger balls in the preliminary compartment of this two-compartment tube mill have collected against both the feed-end head and against the face of the partition, with the smaller balls remaining in the center. In the secondary compartment there is a gradual and definite increase in the diameters of the balls from the feed end toward the discharge end, and the very largest balls are definitely lodged against the discharge screen. This test is typical of many others and demonstrates that balls of mixed diameters tend to classify themselves improperly. This conclusion has been confirmed by many investigators, including J. F. Myers, of Tennessee Copper Co., and chairman, Committee on Mining Methods, A.I.M.E. In the February, 1948, issue of *Mining and Metallurgy*, on page 82, Mr. Myers stated the following:

"The 'minor scandal' reported last year about the tendency of the larger balls to migrate to the discharge end of cylindrical mills, displacing the small balls, which take up residence at the feed end, has been given considerable attention. *In every case where the ball charge was completely sampled under full load this condition was found to be true.* Superficial investigation of surface conditions of the ball charge, or where the ore was ground out, has been the cause of some apparently contradictory evidence. Tennessee's Tricone shell, with a 5-deg. slope, is designed to correct this horizontal migration. This slope has been proved at Hayden to be ample where a 7- x 10-ft. cylindrical mill was lined with the same degree of taper. In the cement-grinding game, operators of some of the long

*Consulting Engineer

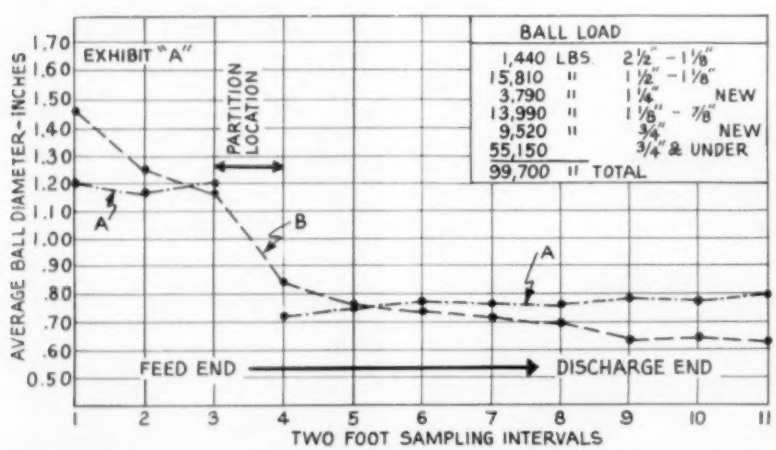


Exhibit A: Curves of a test sampling of ball mill grinding media in a tube mill. Note that the larger balls in the preliminary compartment of the two-compartment mill have collected against both the feed end head and against the face of the partition with the smaller balls remaining in the center

cylindrical mills corrected for migration by means of 4-deg. Carman liners which are said to sometimes increase grinding efficiency 10 to 12 percent. No data are available as to just what this all means in grinding efficiency in wet mills."

From the above quotation it is evident that the mining industry recognizes the importance of proper grinding-ball classification in improving grinding efficiency—and is attempting to do something about it.

Effect of Shape and Speed

As the shape and speed of rotation of grinding mills affect the action of grinding balls, their classification, and therefore grinding efficiency, it is well to examine this subject too. Ball and tube mills are conventionally manufactured in a straight cylindrical shape, for which there are some logical reasons. One of these is that it is simpler, and perhaps economical, and results in little waste of plate. Such a shape also allows the use of standard and interchangeable shell-liner plates throughout the entire length of the mill. But the primary reason is a technical reason since it has been determined through research that for best efficiency there is a single and correct rotative speed for each diameter of ball or tube mill which may only be obtained through the adoption of this single-diameter cylindrical shape. It is therefore not only practical, but technically desirable as well, to design and to manufacture ball and tube mills of cylindrical shape that allow all sections of the mill to operate at the same peripheral speed in correct relation to the proper critical speed for the single diameter selected.

Ball or tube mills that are cylindrical in shape but which have more than one diameter, or mills that deviate from this straight cylindrical shape, violate this cardinal rule that for the best efficiency the rotative speed must be a fixed percentage of the critical speed for each diameter. This may be demonstrated by applying the speed rule to a standard 8-ft. by 7-ft. diameter by 40-ft. long commercial tube mill. In this example a correct peripheral speed inside the liners of 80 percent of critical has been assumed, and the liner plates have been assumed to be 2-in. thick. In this case the 8-ft. diameter section should operate at a speed of 22.10 r.p.m., while the 7-ft. diameter section should operate at a speed of 23.70 r.p.m. If this tube mill is operated at the correct speed for the 8-ft. diameter section, then the 7-ft. diameter section will operate at only 74.6 percent of the correct critical speed. In such a situation the grinding balls in the 7-ft. section will never work at maximum efficiency. This is illustrated in Exhibit B.

If a conical-shaped mill is examined, the speed differentials at various points along the shell of the mill are found to be even greater, as is also shown in Exhibit B. In a mill of this shape the grinding balls in the small diameter end of the mill must operate far below maximum efficiency and with an almost complete lack of cascading action.

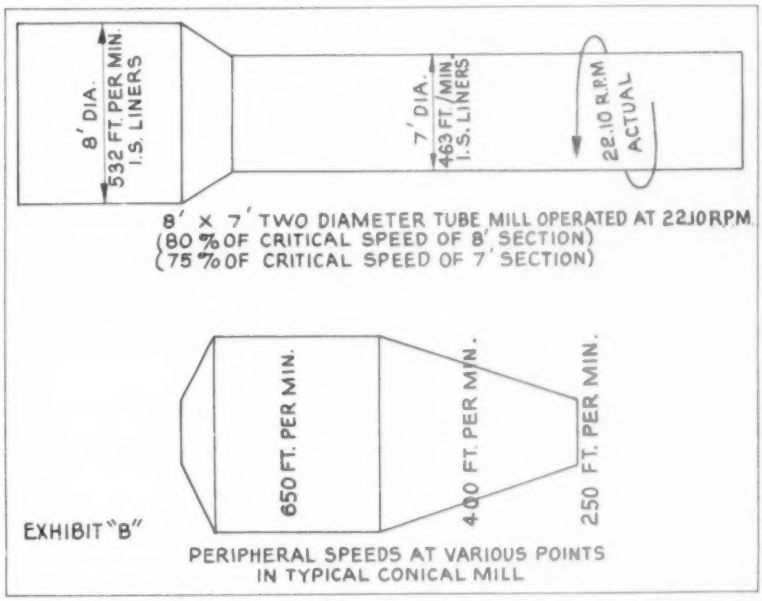


Exhibit B: Illustrating varying peripheral speeds at various points in a conical mill

How Many Compartments?

Because grinding balls of varying diameters, operating in a cylindrical ball or tube mill, or in a compartment of such mill, invariably undergo some degree of reverse classification and because practically every ball or tube mill is operated with more than one diameter of balls in any compartment, some efforts have been made to overcome this migration so that the larger balls will stay in the feed end where they will be available to reduce the larger particles of material before these leave the primary reduction areas.

The accepted method of preventing major migration of large balls toward the discharge end of a cylindrical ball or tube mill, is to install one or more separating diaphragms or partitions within the mill. The use of such partitions has proved reasonably successful but their use has not been entirely satisfactory. At most, not more than four compartments are used, in even the longest tube mills, while the great majority have fewer than this. Partitions are expensive, which influences the number used. A well-designed partition of the double-membrane type, when made of high-grade material, will cost at least $5000 for even a mill of small diameter. And the maintenance cost is high. In addition, no work is performed in a partition, so each partition occupies dead space in a tube mill which adds to the cost of the tube mill.

The tube mill usually is equipped with too few partitions for best results and, as a consequence, the number of compartments in the average commercial tube mill are too long. To prevent reverse classification and to insure a better distribution of balls by size, throughout the tube mill, there should be more compartments and shorter ones, and each should contain balls of a single diameter only. The use of compartments of excessive length induces a second compromise, because the operator usually attempts to overcome this handicap by introducing balls of more than one diameter in each compartment. Even if the original ball charge in each compartment is of balls of a single diameter, the normal wear reduces this diameter and the introduction of new balls of the original diameter as make-up soon creates a ball charge of varying diameters. And as soon as this condition is established, the reverse classification and ball migration begins and continues.

Even when the diameters of the balls within a single compartment of a cylindrical tube mill are relatively the same, inefficiencies occur whenever the number of compartments is too few and their length is too long. This is because there is then generally too great a difference in the diameters of the balls in successive compartments. Under such conditions, the balls at the discharge end of any compartment are normally too large for proper reduction of the material particles at that point, and the balls are generally too small in the feed end of the following compartment. This condition is aggravated by the

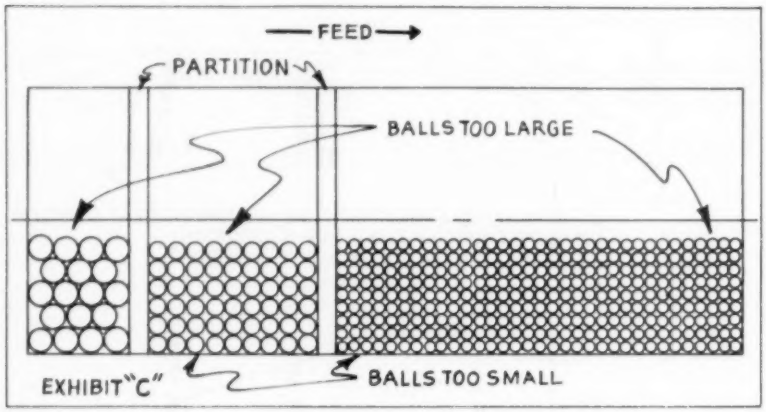


Exhibit C: Showing that even when ball diameters within a single compartment of a tube mill are relatively the same, inefficiencies occur whenever the number of compartments is too few and the length is too long

usual reverse classification and ball migration. This is shown in Exhibit C. In addition to the high initial cost of partitions and the cost of maintaining them, their use introduces some further inefficiencies.

When making an investigation to determine the rate of development of new surface, or work performed, throughout the length of a cylindrical tube mill it is customary to shut down the mill under normal load conditions without cutting off the feed or grinding out the material. Samples of the material in the mill are taken at selected and regular intervals, and these are then analyzed to determine the fineness or surface at each point. Whenever such tests are made in a cylindrical tube mill equipped with partitions, there is always positive evidence that little if any useful work is being done by that portion of the ball charge immediately in front of, or immediately following a partition.

In the first instance it is probable that the material passes into the partition too rapidly, allowing the balls little opportunity to work on it. In the second case it is probable that the material is thrown out too far from the face of the partition for the first balls to come in contact with it. The result is a waste of power at these points and a decrease in efficiency. Thus the installation of each partition means that the effective length of the tube mill is reduced by approximately 30 in. to 3 ft., which adds to the initial cost of the mill and of the building to house it. This condition is illustrated in Curve *A*, Exhibit D.

From the above discussion it is evident that the use of partitions in cylindrical tube mills is not a perfect, or even a satisfactory, solution to the problem of grinding ball classification, segregation, and migration. At best the use of partitions is a compromise that is unsatisfactory from either an economic or an efficiency standpoint.

Until recently, the only other commercial attempt to solve the problem of grinding ball classification and migration has been by means of the conical ball mill. Because of its shape, the conical ball mill has proved to be a perfect solution to the problem of eliminating reverse-grinding ball migration and classification in short mills. In these mills the grinding ball charge remains uniformly graded by diameters, with the largest diameter balls always at the feed end where they should be. This type of ball mill is widely and successfully used in the mining industry and is entirely suitable for preliminary grinding work in other industries, or wherever a fine-ground, finished product is not required.

While the ball classifying action is successful in commercial conical-ball mills, these are primarily ball mills only, and if made much longer the ball classifying action would become less effective, in proportion to the increase in the length of the cylindrical barrel. This classifying principle is therefore limited for use in the longer tube mills required for fine grinding in the portland cement industry.

It is possible, however, to design a long tube mill to utilize the classifying principle of the conical-ball mill. Such a tube mill would be constructed as a truncated cone with the entire length of the shell made to a slight slope, which need not exceed 3 deg. The large diameter end would be the feed end. A mill of this type would classify the grinding balls perfectly, but would have the same defects regarding rotative speed as has any conical or multi-diameter mill, as only one portion of the shell could be operated at the correct rotative speed for its diameter.

As previously pointed out, the ideal ball charge is one in which there is a uniform diminution of ball diameters from the feed end to the discharge end, and which results in there being an *ever-increasing* number of smaller and smaller balls to match and to reduce the *ever-increasing* number of smaller and smaller particles of material formed as it is reduced in its passage through the mill. In conical-shaped mills there must always be an *ever-decreasing* number of smaller and smaller balls, operating at progressively decreasing rates of efficiency, to reduce the *ever-increasing* number of smaller and smaller particles of material. Furthermore, if it may be assumed that the level of the top of the ball charge, and of the material in the mill, remains approximately constant throughout the length of a ball or tube mill, then it follows that when the material is fed to the mill at a constant rate it will pass through the mill at a constant rate of speed at every point in the mill. But in multi-diameter mills, either cylindrical or conical, the material must pass through at constantly accelerated speeds because of the constantly decreasing volume from

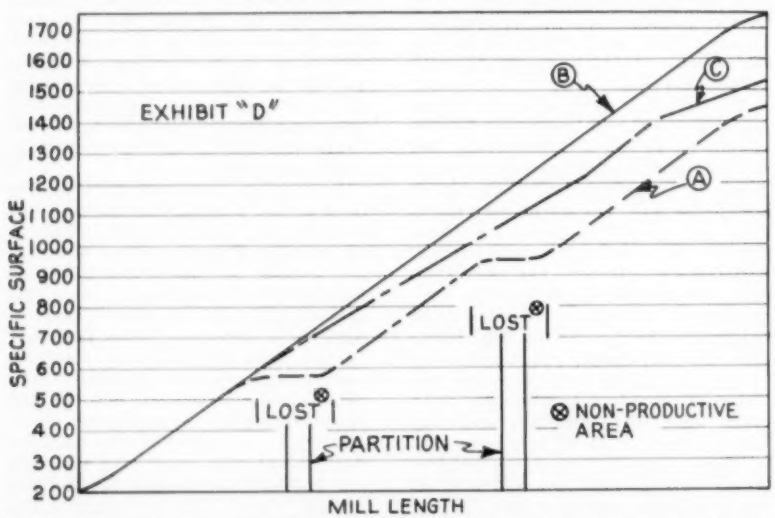


Exhibit D: Waste of power and decrease in effective length of tube due to partitions in tube mill

feed to discharge end. This means that the fewer and fewer smaller balls will have less and less time to work on the material. For the mining industry, or wherever a minimum of fines is desirable, this is an ideal situation. But in the portland cement industry, the use of such types of mills is necessarily restricted to primary work only.

A third solution to the ball migration and classification problem may be solved in straight cylindrical mills by installing such mills in such a position that the axis of the mill, and the shell, slopes a few degrees from the horizontal, as was mentioned by Mr. Myers. As long as the feed end of such mills is slightly lower than the discharge end, there is no question but that perfect ball classification would result, and reverse ball migration would stop. There should be no loss in efficiency. The slope of such a mill would not have to be greater than 3 deg. The only objection would be from the added thrust imposed upon the feed-end head and trunnion. Existing mills might not be properly designed to handle this thrust, but new mills could be designed to take this. As most mills take any thrust at the discharge end, and are also driven at this end, such an installation would introduce other problems, but none that could not be solved.

From the preceding review of the methods commonly used to control grinding ball migration, and to classify grinding balls, it is evident that there is no satisfactory remedy in general use. It is encouraging to be able to report, however, that a satisfactory method has been found to solve these important problems effecting grinding efficiency. This method has been tested with excellent results in several commercial grinding installations in the portland cement industry. Its use insures practically perfect classification and gradation of grinding balls in straight cylindrical tube mills, eliminates the bothersome reverse classification evil, and results in increased production, decreased power consumption per ton, as well as in lower maintenance and installation costs. No partitions are required. Of equal importance is the fact that this new method is suitable for use in any standard and existing cylindrical ball or tube mill.

Ball-Classifying Shell-Liner Plates

This method is simple and practical as it consists solely of using specially shaped ball-classifying shell-liner plates. This idea was invented and patented by the late Charles Lewis Carman, who was one of the outstanding designers of cement, crushing, and mining machinery; and who designed and patented the original Gates and Austin gyratory crushers in addition to the original Kennedy-Van Saun gearless gyratory crusher. This Carman patent covering the ball-classifying shell-liner plates has now expired, and a new French patent has recently been granted covering the same principle.

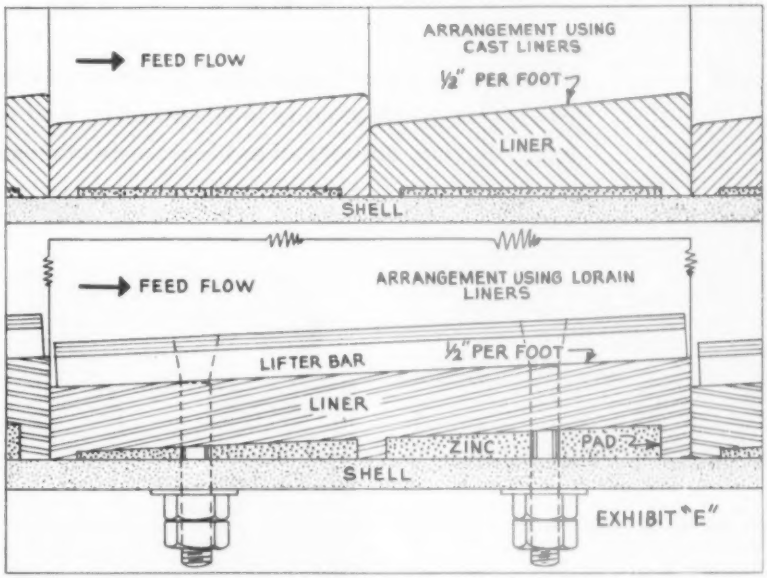


Exhibit E: Sketch of installations of ball-classifying liner plates using cast and rolled sections

The basic principle of the Carman patent is identically the same as that of the conical-ball mill, but adapts the idea for use in all straight cylindrical ball or tube mills. Practically all tube-mill, shell-liner plates are installed in parallel annular rings regardless of whether or not the liner plates are held in position by bolts or by wedging. The Carman ball-classifying shell-liner plates are installed in the same manner as the conventional plates. Each annular ring of the shell-liner plates is formed in the shape of a short truncated cone of small slope, the length of which is the longitudinal length of the shell-liner plate. With cast liners, this shape is obtained by slightly increasing the thickness of the liner plate at the end toward the discharge end of the mill, and by slightly decreasing the thickness of the plate on the other end toward the feed end of the mill. This results in a slight slope in the inner surface of the longitudinal face of each shell-liner plate. This slope need not exceed 3 deg. The average thickness of the cast plate remains the same as that of the original conventional plate of uniform thickness. The difference in the internal diameters of each end of a single annular ring of these shell-liner plates is so slight that it does not appreciably affect the correct rotative speeds for any part of the liner

(Continued on page 151)

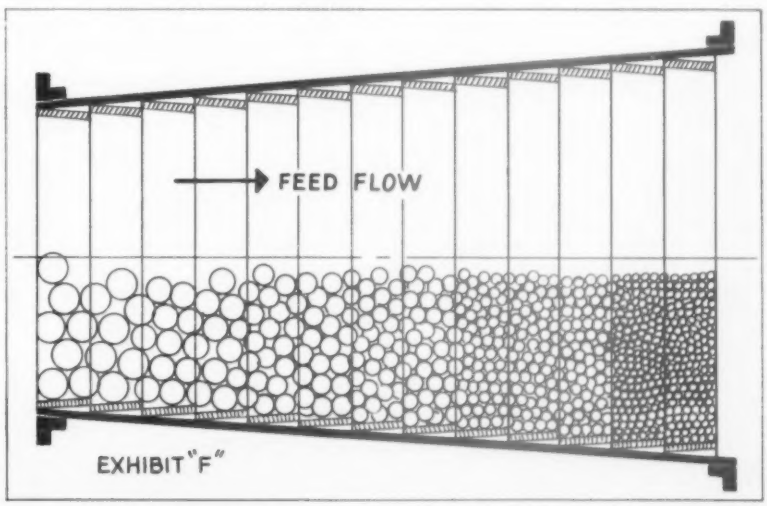


Exhibit F: Tube mill of truncated cone shape with ball-classifying shell liners

EXPANDING USES FOR VERMICULITE

Annual meeting of Vermiculite Institute in Chicago brings up-to-date latest developments in fireproofing and insulation, methods of installation, acoustical products, and status of housing demand

THE ANNUAL MEETING of Vermiculite Institute of Chicago was held March 23 through 26 at the Edgewater Gulf Hotel in Edgewater Park, Miss. Representatives from all parts of the United States and Canada were present, as well as two delegates representing Hawaii and Japan. This year the theme of the meeting was "Vermiculite Application," with emphasis on quality workmanship in the completed installation.

"Our industry is concentrating on the vermiculite job the customer buys," C. A. Pratt, president of the institute, explained. "We are also interested in new mechanical equipment to install certain vermiculite products, which will mean lower costs."

Of special interest to the concrete industry was the talk given by H. W. Steiff, vice-president of Western Mineral Products Co., Minneapolis, Minn., who discussed air-placed vermiculite concrete.

"Construction engineers have been seeking an economical method of insulating and fireproofing steel structures," Mr. Steiff stated. "A more economical way of insulating masonry buildings for industrial and commercial use is needed. And much concern is being shown for a more practical application of insulating on steel tanks.

"We believe the solution to these problems is air-placed vermiculite concrete, which combines superior insulation and fireproofing properties with important values of light-weight, strength, durability, and low cost. The fact that air-placed vermiculite concrete is non-corrosive to steel is also important.

Retiring president, C. A. Pratt, hands gavel to president-elect, J. B. Lyall

"Our first test on a 1:12 mix of this air-placed concrete resulted in a "K" factor of .95, a density of 40 lb. per cu. ft., and a compressive strength of 190 p.s.i."

High Insulation Factor

Mr. Steiff said that a recent fire test of a steel tank covered with a 3-in. thickness of air-placed vermiculite concrete disclosed that after 40 min. in a furnace temperature of 1794 deg. F., the temperature on the inside of the tank had risen to only 220 deg. F. The highest recorded temperature beneath the insulating concrete at the steel surface of the tank did not exceed 237 deg. F. after a two-hour period during the test, he added.

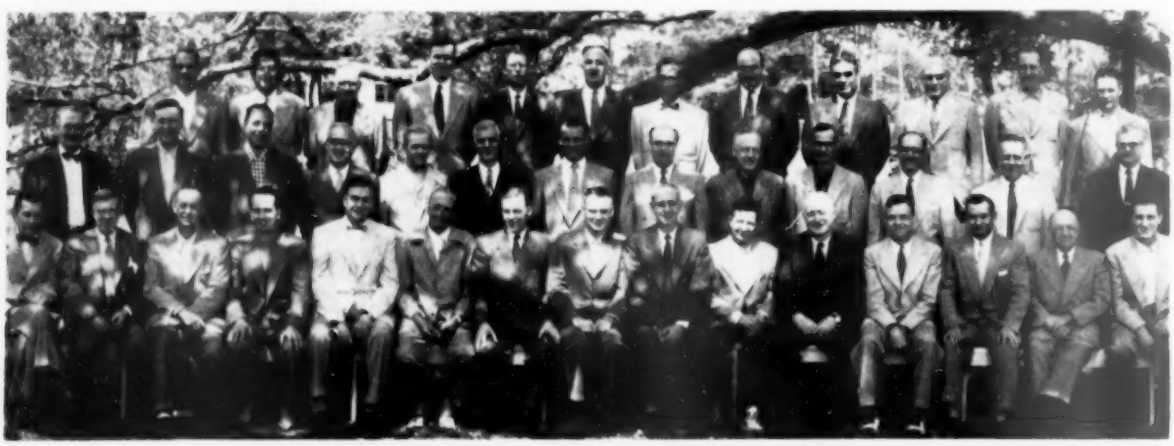
Stanley K. Robinson of F. Hyde & Co., Montreal, Que., reported on a new vermiculite-asphalt roof fill. This consists of expanded vermiculite granules with a density of less than 8 lb. per cu. ft. and graded to pass a $\frac{3}{8}$-in. square mesh sieve. The granules are coated on the job with a special asphalt, which binds the vermiculite together into a tough, flexible mat. The fill can be poured in any shape or thickness. It has a good "K" factor (.67), does not crack under distortion or flexure, and has high water resistance, Robinson stated.

"The simplicity of installing such roofs has particular appeal for parts of the country where climatic conditions are variable," he continued. "Such roof jobs can be started, completed, and covered in a relatively short time in any temperature or weather condition that men will work on roofs, and still meet the requirements for bonded built-up roofing."

R. W. Sterrett, president of Southern Zonolite Co., Atlanta, Ga., discussed short-span precast vermiculite concrete roof tile and showed a film covering its installation. This new, lightweight slab combines insulation and structural strength, and is designed for use over bar joists and bulb tees. The under-side is attractively finished, which eliminates the need for an additional ceiling.

D. C. Goff of Zonolite Co., Chicago, discussed vermiculite concrete underground pipe insulation.

Reporting on the activities of the institute's plaster committee, Chairman Dayton L. Prouty, vice-president of Zonolite Co., Dearborn, Mich., called attention to the many fire tests that have been run during the past



Members and guests who attended the annual meeting of the Vermiculite Institute

H. W. Steiff, vice-president, Western Minerals Products Co., Minneapolis, Minn., reports on air-placed vermiculite concrete insulation and fireproofing

year on vermiculite plaster fire protection, and pointed out that vermiculite continues to lead the field in lightweight plaster fireproofing. The institute's new plaster film, "Lightweight Champion," has been exceptionally well received, Mr. Prouty asserted, and has been shown at many meetings of architects, contractors, and builders.

C. H. Wendel, president of California Zonolite Co., Los Angeles, Calif., described the use of the new plaster pump to spray on vermiculite acoustical plastic. Several attractive textures can be produced with this machine application, and the material has the additional advantage of being fireproof.

Other speakers were A. T. Kearney, D. J. Boone, and M. G. Quayle of Zonolite Co., Chicago; L. G. McDiarmaid of Insulation Industries, Ltd., Vancouver, B.C.; J. A. Kelley, Carolina Vermiculite Co., Travelers Rest, S.C.; and Dr. G. E. Ziegler, laboratory research director of Evanston, Ill., who explained the industry's research program.

Guest speaker James C. Downs, housing and redevelopment co-ordinator of the City of Chicago, predicted a continuation of the high-volume building activity of the past few years for the year ahead.

Housing Demand At High Level

"There has been a good deal of talk about a decline in the demand for new houses that is belied by the facts," Mr. Downs asserted. "More people want new homes today than ever before in the history of our country. We are greatly stepping up the destruction of old housing through our programs of slum clearance, urban redevelopment, highway construction, and public works. We are experiencing a 20th century revolution in industrial and retail merchandising that is reflected in radical changes in the design of buildings occupied by manufacturers and retailers."

R. W. Sterrett, president, Southern Zonolite Co., Atlanta, Ga., describes precast vermiculite insulating concrete roof slabs

A. T. Kearney, president, Zonolite Co., Chicago, outlines plans for increased production of vermiculite

J. B. Lyall, vice-president of Vermiculite-Northwest, Inc., of Spokane, Wash., was elected president of the institute. Two new directors were also elected: Dayton L. Prouty and Lee Irvine, vice-president of Intermountain Insulation Co., Salt Lake City, Utah.

J. B. Lyall, president

S. K. Robinson of F. Hyde & Co., Montreal, Que., discusses new vermiculite-asphalt mix for roof fills

LETTER TO EDITOR

Structural Chemistry of Aggregates

Dear Mr. Rockwood: I have been following your series of articles on "Prospective Chemistry" in ROCK PRODUCTS. This is a very interesting and informative series and I look forward to future numbers.

My interest in the series is at least two-fold. In teaching mineralogy to chemists, engineers and geologists I have found it necessary to abandon the traditional method of teaching exemplified by standard texts. Much of our course follows the approach you are using in your articles. In addition to crystal chemistry we spend a major portion of our time on silicate chemistry.

For the past few years we have been doing some research on the petrography of limestones for the Iowa Highway Commission. This is to discover, if possible, the reasons why certain limestones have unsatisfactory service records in highway slabs. The answer may be in crystal chemistry but we are hoping it will not be.

Will reprints of your articles be available? If so, I hope you will send me one. In fact I have 25 students in mineralogy right now who could use the material of the first five articles to advantage. Some of them are reading the library copies.

Congratulations, keep up the good work.

Chalmer J. Roy,
Professor of Geology,
Iowa State College,
Ames, Iowa.

Pacific Building Materials Co., Portland, Ore., operates dredge with crane-clamshell unit for digging. Dredge plant includes double-deck vibrating screen, stacker belt conveyors, water pump, and diesel-electric power

By WALTER B. LENHART

Dredge equipped with mobile crane and clamshell for digging, to the right, with screen, log washer and sand screw, to the left

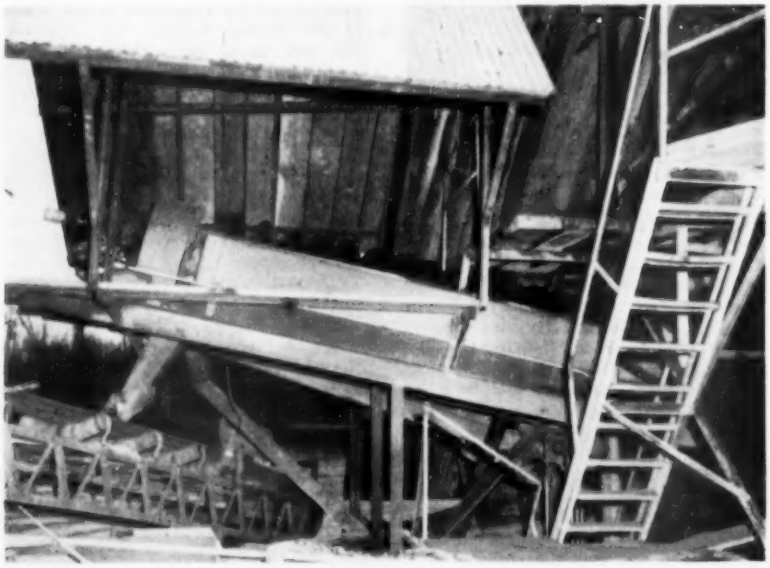
DREDGING WITH MOBILE CRANE

ONE OF THE LARGEST sand and gravel and ready-mixed concrete producers in the Portland, Ore., area is the Pacific Building Materials Co. The Curry Street plant was described in ROCK PRODUCTS, August, 1949, p. 221. The Albina plant is the older sand and gravel producing unit.

Both these plants receive raw material from gravel dredged from the Willamette river using clamshell type dredges loading to barges. The company has a fleet of 16 barges, each of which holds 700 tons of material, and two tug boats. One of the tug boats is a converted "sea-mule," powered by a 300-hp. General Motors diesel, and the other has a 320-hp. Fairbanks Morse diesel unit.

As the material dredged from the Willamette river is deficient in the finer sizes, only a concrete sand is produced from that river source. There are three types of sand in use in the Portland area, two of which are finer than conventional concrete sand. These two finer gradations are secured from the Columbia river. The two sands are a masons sand and so-called "muck sand." The latter is somewhat of a misnomer for the muck sand is a clean, sharp sand and is somewhat finer than the regular minus ⅛-in. masons sand. The muck sand makes an excellent additive to the mixes used in the company's ready-mixed concrete operations and also for black top work.

The Willamette river empties into the Columbia river about nine miles downstream from the heart of Portland. Along the margins of the Columbia, near where it empties into the Willamette, are bars of sand of various gradations. Practically no gravel is present and very little sand that is coarser than plus ⅛ in. However, by selecting the right bar a high percentage of masons sand can be produced with a minimum of the muck sand, and vice versa.



Sand preparation machine with chute to belt conveyor

Digging from Dredge with Mobile Crane and Clamshell

To supply the growing demand in Portland for masons and muck sand, and to furnish sand for the company's own ready-mixed concrete operations, the company built and placed in operation last year a new, all-steel dredge. In March of 1952, the dredge went into operation and during the remainder of the year produced in excess of 80,000 cu. yd. of material. The company designed and built the dredge. The equipment is mounted on a barge made up of 80 steel, war-surplus pontoons. Most of the pontoons were 5 x 7 ft. and 5 ft. deep. Each can lift about 5700 lb. A few pontoons for the front section were 7 x 7 ft. and 5 ft. deep. They were joined together by welding. At the corners, where four of the pontoons come together, plates were used and these were welded to the assembly. The pontoons made a total deck area of 35 x 84 ft.

For digging, a crawler-mounted

Rex Childs, general superintendent. A. H. Fleener, clamshell operator, and John McDowell, plant operator

Two stacker belt conveyors, one for masons sand and the other for "muck" sand, loading barge from dredge

Lorain No. 75 operates on the deck. A 1-cu. yd. Owens heavy-duty, round-nose bucket is suspended from an 80-ft. boom. The Lorain is not mounted permanently but retains all its usual mobility. It is powered by a 13,000-D Caterpillar diesel.

The equipment includes two stacker conveyor belts (a 24-in. and a 30-in.) that finger out at an angle and are mounted at the sides of the boat so that the two sizes of sand can be loaded to a single barge if desired. In this event one end of the barge has masons sand; the other muck sand.

Equipment Easily Removed

It was felt that possibly market conditions in the area might be such that the equipment would not be dredging sand all the time. During such off-periods, the clamshell could be used to unload at Columbia and Willamette docks any river-borne material, such as gravel, ores, silica sand for metallurgical plants along the river, and other types of loose material. With this in mind, the two stacker conveyors were so designed that the Lorain can easily lift off and stack them parallel to the long axis of the main deck, one on each side of the boat. However, the equipment has been digging sand practically all the time. It operates day shift only.

The dredge unit is located a short distance up-stream on the Columbia river from the mouth of the Willamette river. The haul to the Curry Street plant is about 15 miles; to the Albina plant some 10 miles; and to the company's ready-mixed concrete plant and docks at Vancouver, Wash., the haul is about three miles up the Columbia river. To reach the dredge, a dirt road that follows the Oregon side of the river is used to within a few hundred yards of the operation, and a small gas-driven boat is available for transportation to the dredge. The small boat is kept at the dredge. Two men operate the entire plant, one running the clamshell and the other attending to all other operational functions.

Log Washers Remove Foreign Materials

Sand recovery is quite simple. The clamshell-equipped Lorain discharges to a steel hopper that feeds direct to a 7- x 14-ft. "EL-Jay" double-deck, vibrating screen. The top deck has ⅜-in. slotted wire and the bottom has ⅛-in. wire. The top deck is a wear-taker, removing mostly any river-borne foreign material. Plus fractions from both decks are wasted, and chuted back to the river. The screen used is a heavy-duty unit made in Eugene, Ore. No trouble is experienced with organic material in any of the sand although water-logged wood bark in the pit-run Willamette gravels is a source of concern to some operators. However, the Curry Street and the Albina plants of the Pacific Materials Co. have both installed bark (or root) removers that are highly successful. These are essentially log washers with the paddles set at such an angle that the gravel is not only thoroughly scrubbed, but it is held back by the blades in such a manner that water turbulence removes the bark. These are also made in Eugene, Ore., by the same company that makes the vibrating screen used on the new sand dredge. The bark removers operate at a little higher r.p.m. than most log washers. Two machines are installed at each plant. Clay balls in the Willamette gravels are not a problem, but the gravel particles are slightly coated so that adequate scrubbing and washing is necessary.

However, these problems do not appear in the sands from either river. The minus fraction from the EL-Jay screen flows to a 36-in. triple-screw flight, Wemco sand preparation machine that has been equipped with a Roto cone variable-speed drive unit. This sand screw prepares the masons sand and delivers it to the off-bearing belt conveyor. The fines overflow from the first Wemco to the second 36-in. sand screw. This is a double-flight unit. The spiral prepares the muck sand and delivers it to its off-bearing belt conveyor. Provisions have been made so that all sand from both machines can be bulked and off-borne by one belt conveyor. The plant has a nominal capacity in the 60 to 80-cu.

Close-up of dredge, showing screen below hopper in background

yd. per hour range. Capacity depends somewhat on the type of material being dug and has been as high as 100 cu. yd. per hour.

Power for the dredge operation is provided by a Model 3-268 A General Motors diesel that drives a 100-kw. generator. Water is obtained from a Weinman deck pump, powered by a 40-hp. motor, that delivers 1000 g.p.m. A 2000-gal. capacity fuel-oil tank is mounted on the deck. Also mounted on the deck is a three-drum Washington anchor winch powered by a 50-hp. motor. Shore lines are not normally used; only anchors. A second three-drum American winch is used for moving the barge that is being loaded. The barges are 140 ft. long, 38 ft. wide and 12 ft. deep. They are of wood construction.

Frank Penepacker is president of the Pacific Building Materials Co. with offices in Portland, Ore. Rex Childs is general superintendent of operations. A. H. Fleener is the crane operator on the dredge, and John McDowell is deck man.

Selling Agstone As An Investment

By DR. F. G. MERKLE*

IN THE STATE OF PENNSYLVANIA we may conveniently divide all agricultural and horticultural enterprises roughly into four categories with reference to liming practice. In the first group are those general farms, orchards, and vegetable units which have used liming materials as an integral part of their soil management program for the last century or two. In general these growers are located near natural supplies of limestone where the practice of liming developed early in the history of the farming and horticultural industry. The growers apply liming materials regularly with no thought of ever slackening up on the practice. Their soils have become quite well neutralized and the effects of the surface applications are discernable in the upper part of the subsoil. These areas coincide quite closely with areas of good farming and outward signs of farm prosperity. The owners seldom test their soils in these areas because they are sold on the recurring need for liming materials. There have been some evidences that an occasional soil analysis might be justified to avoid over-liming or at least to avoid the expense of applying liming material when it may not be needed. During this period of one or two centuries there has been ample time for complete mixing of liming materials with all parts of the soil and to develop a microbial population everywhere in the root zone.

A second grouping includes those farms and horticultural units upon which liming has been intermittently practiced and for a much shorter period of time than those of group one. They may be in areas more distant from good supplies. The members of this group are also well convinced of its value in their soil-building program. Many in this group have not applied enough to perform the desired functions. They might profit by spot testing if for no other reason than to convince themselves that they have not yet used enough. Too often we observe farmers who appear to feel that one treatment ought to transform a soil from an acid one to a neutral one when in reality it may require heavy initial applications followed by lighter follow-up treatments.

Some Farmers Need Loans

The third group includes those who have tried an entirely too small application and never followed it up with subsequent treatments. They have observed little or no benefits and are discouraged with the practice. "Too little and too late." These may be considered as members of the expedient group. Unless they see immediate and definite results from liming material in the year that it is applied, they think it of no value. They have no thought for soil-building for the future. Possibly many in this group lack the initial funds to make the first treatment and require some sort of loan until they can get started.

The last group includes those who have never used liming material or, if ever, not enough to produce any benefits. These farmers are farming against severe odds. Their yields are small and they have no spare money to invest in long-time soil improvement. Hence they never experience the benefits which might come from a well built soil. A soil test may be of little use to this class. They couldn't do anything about it even if they knew their soils were acid. They probably need some sort of a loan or subsidy to get them on their feet.

Long-Term Benefits

The important point for both the farmer and the salesman to understand is that liming a soil which needs it badly will not, in most instances, produce immediate results. Most fertilizers, particularly those supplying nitrogen, give immediate results. In fact the major return is realized in the year they are applied. This is what most farmers like, particularly the shortsighted expedient farmers. But as brought out above there are many reasons why liming many so-called acid soils may not show significant benefits for two, three, or four years after it is used. In the first place, the first application to be applied on a thoroughly acid soil should be more than the measured agricultural limestone requirement. This is necessary because limestone is not water soluble. It must slowly dissolve on its surfaces. Then the soil acidity must dissociate into the soil moisture. Then the calcium and the colloidal acids must combine. All this does not take place quickly in a soil having only 15 to 20 percent moisture. The writer has limed many acid soils up to their full lime requirement in May only to find that by mid-summer a very slight change had taken place in the pH value of the soil. The saturation of winter and spring helps much to accelerate this reaction. Hence, the failure of the application to bring the desired results the first or even the second year and the necessity of making the initial application generous. Then also lime must transform the microbial population from the acid tolerant type to the calciphile type. This likewise requires time. The soluble and dispersed iron, aluminum and manganese must be inactivated and this requires contact, moisture, and thorough mixing of the liming material with the soil. The salesman and the extension man must, therefore, explain and the farmer must appreciate that patience is required for fundamental soil building.

Concrete evidence that the soil improvement effected by liming does not take place immediately, and that the benefits increase with time is afforded in certain field experiments conducted at the Ohio and Illinois experiment stations. At the Ohio Experiment Station in a rotation of corn, oats, wheat, and clover extending over a period of 18 years the increases due to liming for the first rotation were: corn 4.4 bu., oats 1.1 bu., wheat 2.1 bu., and for clover 1280 lb. The average increases for the entire 18-year period were: corn 15.8 bu. per year, oats 2.6, wheat 4.4 and clover 1500 lb. This shows that the full value of liming in this rotation was not realized during the first four years of the rotation.

In a large number of field experiments running over a period of 16 years conducted by the Illinois Experiment Station, the increases from liming during the last course of the period were in all cases larger than the average for the entire 16 years. For example, the average value of increase per rotation for the entire period on 10 light soils was $7.63 due to liming. The value of the increases for the last rotation in this 16-year period was $11.32. These data and many others all attest to the fact that the practice of liming, if balanced by adequate fertilizing and with a soil building rotation, will lead to a gradual soil buildup which increases with time. They also show the folly of judging the need of liming material by the first year's performance.

*Professor of Soil Technology, School of Agriculture, Pennsylvania State College

FINE GRINDING

Capacity Increased

Liberty Limestone Co., Buchanan, Va., adds 73-in. roller mill to boost agricultural limestone production

By L. DAVID MINSK

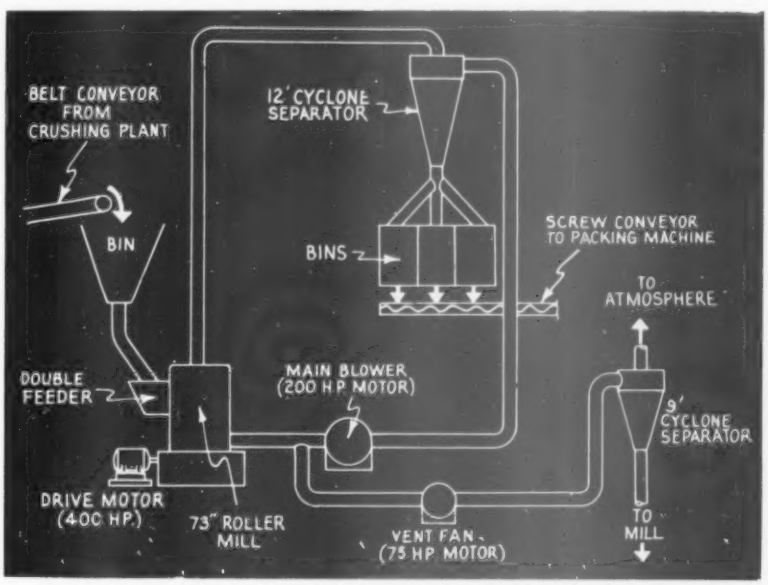
Crushing, screening and grinding plant with quarry in background. New roller mill is in building, to the left

A MODERNIZATION PROGRAM at Liberty Limestone Corp's Buchanan, Va., plant was recently highlighted with the installation of a 73-in. Raymond roller mill, reputedly the largest in the agricultural limestone field. Its capacity is said to be 3½ times that of the 54-in. mill which the new unit replaces. It has six rolls and a 12-in. bull ring. Agstone sales in the area are highly competitive, and this need for increasing production, coupled with the rising cost of labor, influenced the company in its selection of an oversize crusher. Several large industries in the vicinity have absorbed any labor surplus with offers of high wages.

The new mill has a capacity of 35 t.p.h. with approximately 65 percent passing 200 mesh. Feed size is minus ¾ in. The entire agstone grinding plant has a capacity of 1600 t.p.d., representing the output of the new 73-in. mill, three 54-in. mills, and an older 48-in. mill. Each has its own feed bin, feeders and cyclone circuits, but discharges to a common finished, products bin.

Automatic double feeders feed the new mill, which is driven by a 400-hp. Westinghouse motor. A 12-ft. cyclone separator is in closed circuit with the mill, with air supplied by a fan driven by a 200-hp. motor. Air is heated to 150-200 deg. F. A vent fan driven by a 75-hp. motor connects by ductwork to a 9-ft. cyclone. This unit removes up to 2 tons of water per day. It is vented to the atmosphere, with oversize returned to the mill.

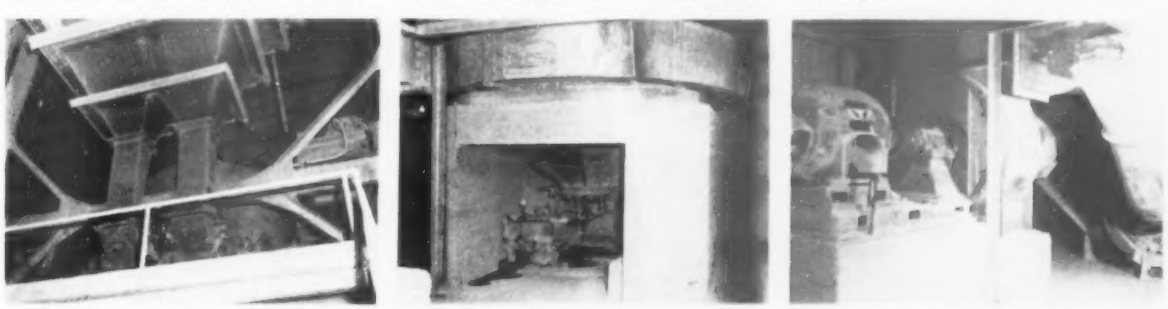
Forty percent of the plant's output is shipped in bags as "Liberty Limestone"; the remainder is shipped in bulk for use in fertilizer. The agstone guaranteed analysis is $CaCO_3$ 54 percent $MgCO_3$ 43 percent, $CaCO_3$ equivalent 105 percent, with 70 percent through 100 mesh.



Flow diagram of mill grinding circuit for the production of agricultural limestone

Bagged material is loaded into rail cars by fork lift trucks. As bags slide down a chute from the packer they are guided into a raised fork of a truck. As each bag is placed on the fork by a workman, the truck driver lowers the fork to keep it at the level of the chute discharge.

The company has a second plant at Rocky Point, about 10 miles from Buchanan. An entirely new grinding plant is soon to be placed in operation to replace one destroyed by fire last year. It will have a capacity of 900 t.p.d.



Left: Seventy-three inch roller mill is fed by two automatic feeders from a common bin. Center: Lubrication equipment under mill. Right: Main blower (center) is driven by a 200-hp. motor, and to the right is the vent fan

Market and Technical Problems of

INDUSTRIAL SAND INDUSTRY

Discussed at Annual Meeting

National Industrial Sand Association meeting topics include freight rates, labor-management relations, percentage depletion, industrial health and business conditions

NEARLY 100 PRODUCERS and their wives attended the 18th annual meeting of the National Industrial Sand Association, May 13-15, at The Homestead, Hot Springs, Va. Lively discussion from the floor on current problems made this meeting one of the most interesting and useful in recent years.

Officers

The following officers were re-elected: C. M. Hardy, Hardy Sand Co., Evansville, Ind., president; Clarence R. Wolf, New Jersey Silica Sand Co., Millville, N. J., vice-president; and Emery M. Durstine, The Keener Sand and Clay Co., Columbus, Ohio, treasurer. Members of the board elected at this meeting were: N. C. Bos, Producers Core Sand Corp., Michigan City, Ind., and John N. Bos Sand Co., Chicago, Ill.; Harte Campbell, Sun Sand Co., Thayer, W. Va.; Wm. J. Cannon, The Nugent Sand Co., Muskegon, Mich.; P. G. Forman, Industrial Silica Corp., Youngstown, Ohio; G. M. Mason, Clayton Silica Co., Waterloo, Iowa; and Marcus S. Wright, Jr., South River Sand Co., Old Bridge, N. J.

President C. M. Hardy, in opening the session, said that the industry is facing an uncertain period which called for alert management in meeting problems. He also referred to the recent death of Dwight L. Manley on April 3, and called the roll of those who had died since the organization of the association.

V. P. Ahearn discussed the status of percentage depletion legislation and regulations in which he commented on the bill introduced by Congressman Bennett of Florida which would in effect deny relief to all industries except those having depletion allowances prior to 1951. He expressed the belief that this bill had little chance of passage. Regulations governing percentage depletion, he thought, would be issued sometime in June. A. Y. Gregory, chairman of the Depletion Committee, suggested that members of his committee meet as soon as possible after the regulations are announced. Considerable discussion followed in which members gave their experience with respect to interpretation of percentage depletion allowances by the Internal Revenue Bureau examiners. In one case only the cost of the bags was excluded in figuring depletion allowance which was accepted by the examiner. In another case a producer had received a credit for drying sand. The Depletion Committee was authorized to use its discretion in instituting any action that may be necessary as a result of a study of the new regulations. Mr. Ahearn said that if a member feels that he is entitled to a 10 percent or even 15 percent allowance, based on the use of the product for chemical purposes, he should seek it.

Clayton Devine of the Silica Sand Traffic Association of Illinois commented on the railroad car supply situation. It is a little tight, he said, on covered hopper cars with demurrage charges ranging from $5 to $20. The heavy movement of soda ash and cement in this type equipment is largely responsible. The box car situation in most areas will not be tight until possibly September. Shortages will be more pronounced in the West. Sterling Farmer told about his experience in the Cleveland area where cars are received in bad condition and costs for cleaning and repairs are mounting. Emery Durstine suggested that all members set up cost data on repairing and cleaning cars. Geo. W. Cannon reported, on the other hand, that his company had been getting cars in good condition; cars will not be accepted which have been used for cement or soda ash. Railroads are charged for sand blasting cars.

Arthur Schlesinger with his effervescent smile

Due to a conflict in dates with the American Foundry Society's 1954 convention meetings it was not possible to hold the 1954 meeting of N.I.S.A. on May 12-14, at The Homestead as originally planned. As no other suitable dates could be arranged for a meeting at Hot Springs, tentative plans are to hold the meeting at Palm Beach, Fla. in April. The fall meeting

Officers of N.I.S.A. for 1953. Left to right: Emery Durstine, treasurer; C. M. Hardy, president; and Clarence Wolf, vice-president

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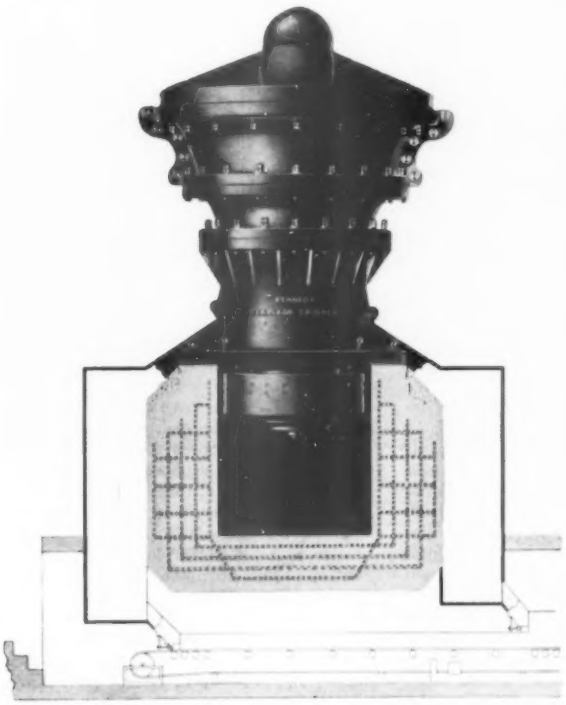

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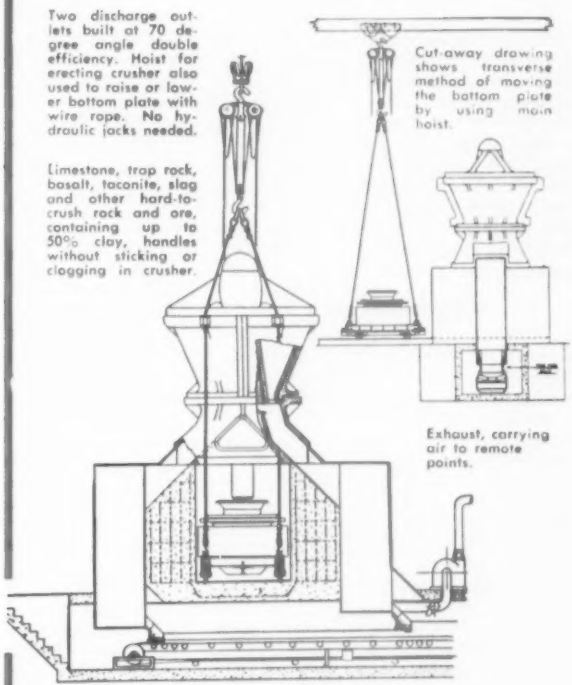

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At the speaker's table, left to right: Theo. Hatch, Clarence Wolf, J. M. Strouss, and T. C. Waters

of the association will be held October 21-23, 1953 at the Greenbriar Hotel, White Sulphur Springs, W. Va., as originally planned.

President Hardy called for a round table review of business conditions. Opinion of members indicated that business may drop off from 10 to 20 percent for the year, depending on the rate of production in the automotive industry and farm equipment manufacture. Third and fourth quarter business is uncertain, and no one was willing to make any predictions. Two members reported business volume exceeding 1952 and were optimistic of the future.

Industrial Health

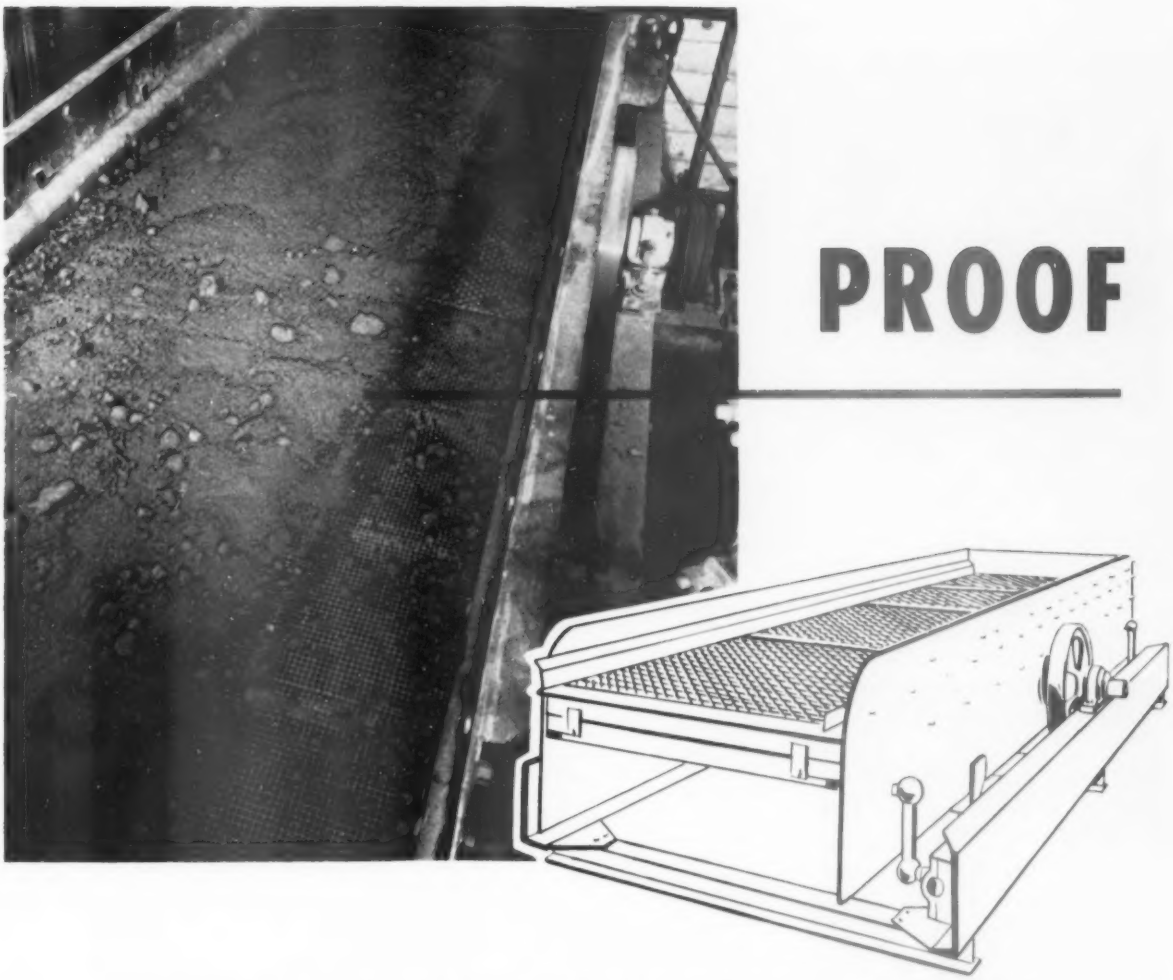
Theodore C. Waters, association counsel, reviewed the "Significant Aspects of the Dust Problem in American Industry." He referred to a meeting at Charleston, W. Va., in which he participated as a panel member in a discussion of the West Viriginia code. He said that medical people are now talking in terms of "disfunction" rather than disability. The West Virginia code permits filing of a claim if only partial disability is present, compensation being based on stages of disability. He reported a trend in legislation in other states toward this end. The West Virginia conference recommended both medical control and engineering control. Mr. Waters warned that sand producers are faced with more stringent regulations and rigorous inspections that would lead to fines and even orders to cease operation. He suggested that the association set up a Health Committee to study and make recommendations and disseminate information on effective methods of control. Mr. Waters also urged members to take a look into their insurance portfolios to see that they are adequately covered for fire, disability and other essential insurance.

Theodore F. Hatch, research adviser, Industrial Hygiene Foundation of America, told about his trip to an international meeting of industrial health leaders at Sydney, Australia and also the recent meeting at Saranac, N.Y. He said that both these meetings were notable in that the discussion and addresses were devoted almost entirely to what was not known about pneumoconiosis rather than what was known about it. He said that the X-ray picture is no longer considered of paramount value in diagnosis of lung damage, but is only one of the tools in determining the complete story. Mr. Hatch explained that pneumoconiosis describes lung damage regardless of the source of dust, but silicosis only results from exposure to free uncombined silica dust. He told about the program which had been set up by the mining companies in the Broken Hill area of Australia which had practically eliminated all compensable cases by a system of medical and engineering controls. Mr. Hatch said that it is not possible to "buy" a solution to the dust control problem. The solution, he said, requires a continuing concern of top management to be successful, regardless of how much money is spent for equipment. He pointed out that it is possible to spend too much money on ventilation equipment and not enough on processing to eliminate dust, and no dust control equipment can operate without adequate maintenance. Isolated studies, he held, do not mean very much, but the pooling of knowledge would be helpful.

Production Problems and Specifications

Stanton Walker, consulting engineer for the association, led an informal discussion on problems of production, specification and uses of industrial sand. He referred to the increasing use of synthetic materials as substitutes for molding sand, and the reuse of sands by new cleaning methods. He pointed out that the buyer of sand very largely determines the specification although individual companies had established certain standards. Mr. Walker said that a lack of reproduceability in test methods indicates a need for a review. He reported that the Navy is undertaking research studies of abrasives which might result in a specification by the Bureau of Ships. Army Engineers had asked for standard specifications for abrasive sand to clean metal plates. He said that competition from steel shot is well known, but there are new substitutes coming on the market which advertise they are not toxic. Mention also was made of the study involving packaging and shipping of silica flour. A lively discussion on substitute abrasives was led by Arthur Schlessinger. Marcus Wright, III pointed out that some of the substitutes for sand abrasives are

Members and their wives lunch alfresco at the Casino, a popular spot for conversation and relaxation



PROOF

SECO DRY SCREENS SAND

at W. F. Saunders and Son, Syracuse, N.Y.

SAVES 25% BANK RUN SAND NORMALLY WASHED AWAY

Here's sand right from the bank being dry screened with a 4x12' single deck Seco at the Syracuse, New York plant of W. F. Saunders and Son. And here's the on-the-job story of the success of this operation. First, a better product because, while this Seco screen efficiently removes the clay balls and stones they don't lose the fines usually washed away in a wet screening operation. Second, a more economical operation because no pipes, pumps or special equipment is needed and they eliminate the approximately 25% loss of material usually associated with wet screening. (Think of the savings in trucking from the pit to the screening plant alone.) Third, a trouble-free operation because Seco vibrating screens require so little maintenance as proven on this and thousands of other installations throughout the country. How about your dry screening problems? Sand, Ag-Lime, etc. Why not consult Seco screening specialists right now. Be assured of prompt, interested help. Our whole organization is devoted to one purpose . . . to build the finest vibrating screens for every job requirement. Write, phone, wire!

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A winning foursome. Left to right: Arthur F. Harrison of Central Silica Co.; Sterling Farmer, Sand Products Corp.; Emery Durstine; Keener Sand and Clay Co.; and Chas. Gorsuch, Ayers Mineral Co.

by-products from manufacturing operations which may be exhausted in a few years.

V. P. Ahearn, executive secretary, discussed the proposed amendment to the constitution which would give

Mr. and Mrs. Clarence Wolf

ex-officio members of the board the right to vote as well as discuss issues and also make members of the board eligible for reelection after a year had elapsed following their term of office. The board of directors recommended the appointment of an advisory Committee on Health which would be authorized to also make an engineering study. Members appointed to this committee are: Earle T. Andrews, Pennsylvania Glass Sand Corp., chairman; Geo. Thornton, Ottawa Silica Co.; Russell J. Cronenweth, Jr., Great Lakes Foundry Sand Co.; Jesse T. Morie, Jesse S. Morie & Son; Arthur F. Harrison, Ayers Mineral Co.; N. C. Bos, Producers Core Sand Corp.; Sterling Farmer, Sand Products Corp.; and Edmund Shaw, National Pulverizing Co.

At the closing session on Friday, an informal discussion of employer-employe relations was held. Members discussed recently negotiated labor contracts, and reviewed their experience in negotiations.

William W. Collin, Jr., reviewed the traffic rate situation and commented particularly on the box car rate case. The carriers had asked for an extension of hearings which had acted as a stay in this case. He mentioned that the reduced rates had become effective May 1. In answering a question from the floor, Mr. Collin said that a tarpaulin-covered car for rate purposes was considered a closed car.

Vince P. Ahearn, executive secretary, addressed the members and their wives, who had been invited to attend the meeting, on the first 100 days of the Eisenhower administration. Mr. Ahearn said that President Eisenhower is faced with tremendous problems, but his administration had gained the confidence of the country by his obvious sincerity and his high regard for the Constitution and the division of government powers. He commented on the capabilities of the cabinet members and their weaknesses, and discussed implications of activities by such personalities as Senators McCarthy, Taft, Bricker and Representatives Velde and Reed. President Eisenhower, he said, is having trouble with the budget and taxes and is faced with a deficit in spite of cuts in expenditure. The trouble is that 80 cents of every dollar of government expenditure is allocated to pay past and present wars and for defense preparations against future wars. Mr. Ahearn also commented on foreign relations, foreign trade, Korea, foreign aid, the McCarron Act, atomic power, and the problem of increasing population.

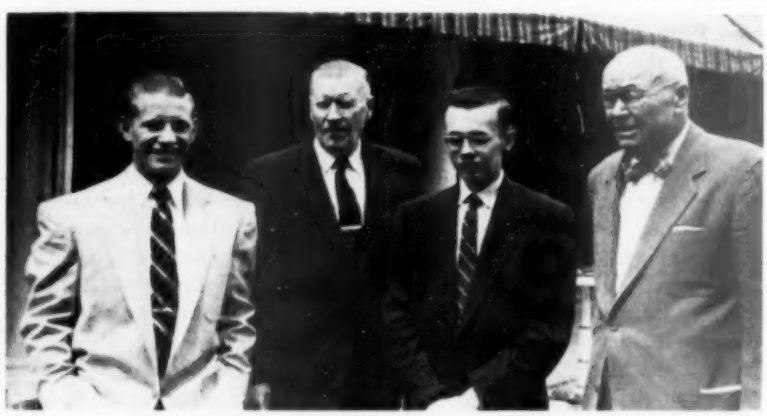
Entertainment was up to the usual high standards with a bridge-tea for the ladies, a cocktail party each night followed by bingo, separate golf tournaments for ladies and men, and one innovation which proved to be popular, a get-together dinner for all members on Thursday evening at which golf tournament prizes were awarded and Clarence Wolf's colored moving pictures taken at Bermuda, and Hot Springs were shown.

Roofing Granules

THE ROOFING GRANULE DIVISION of Minnesota Mining and Manufacturing Co., St. Paul, Minn., established in 1932, has reported a new-high record for 1952 in the production and sale of roofing granules. Pastel roofing granules, including white, reportedly represented an increasing percent of the total 1952 dollar volume.

The company operates three roofing granule plants, located at Little Rock, Ark., Corona, Calif., and Wausau, Wis. Plans are currently underway to expand the Wausau plant and, also, preliminary surveys are being made for the establishment of a granule plant in the East.

The division's research and development activities during the year resulted in the introduction of three new granule items and improved treatment for granules, which reportedly resulted in both improved granule performance and lowered costs. Granule production in 1953 is expected to equal or exceed the 1952 volume.



Three generations, Harte Campbell with his two sons, and E. J. Campbell

Her fingertips imagine the taste

The lady doesn't trust her eyes alone.

The buyer of Multiwalls is in much the same position.

Aside from package design, it's hard to tell one manufacturer's bag from another's simply by looking at it or fingering it.

Put the bags out of sight and you may be able to see many differences.

Men who buy 85 per cent of all Multiwalls consider* these intangibles more important than any other factor when they choose their supplier.

Invariably, these are among the first questions they ask . . .

"Is this company big enough?"

"Do they have a fair allocation policy?"

"Are their prices competitive?"

"Do they respect delivery dates?"

In a nutshell—

"Are they good people to do business with?"

We can't tell you what the answers are when these Multiwall users consider Union. This we do know . . . and the inference is yours to make—

In these days of industrial pressure, when *dependability* is a fervent wish as well as a word, men to whom Multiwalls are important are placing an increasing share of their orders with Union.

More so every day . . .

IT'S UNION FOR MULTIWALLS

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*August, 1951 research study.

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Fig. 1: Ten-inch strain gauge which is applied to kiln shell near tires to determine any difference in length between gauge points

Missouri Portland Cement Co., has found that the use of strain gauges has been more accurate than a transit to align rotary kilns

By JACK SALE*

Use Strain Gauges to

ACCURATELY ALIGN KILNS

THE CONVENTIONAL METHOD of checking the alignment of a rotary kiln is to set up a transit at one end of it and, using a level rod, adjust the rollers at each of the tires so that the same rod reading is obtained at each tire. It is assumed, of course, that the tires are all of the same diameter and if this is not the case, corrections must be made for the differences. With long kilns, however, it is not possible to read the transit with sufficient accuracy to give the necessary precision in alignment. Heat waves and vibrations make the long sights difficult to read. In September, 1952 we became aware that certain tires and rolls on a kiln 450 ft. long were wearing excessively although the transit readings did not show the kiln to be out of alignment.

We felt we needed a more precise method than the transit for testing alignment and decided to apply a Whittemore 10-in. strain gauge to the kiln shell near the tires to see if we could find any difference in length between the gauge points when measured with these points on the bottom of the shell as opposed to turning the shell 180 deg. and measuring the difference between them when they were on top. Our very first set of readings showed that the rollers which were wearing unduly were high and were carrying too much kiln load. This was indicated by the fact that the distance between the gauge points when in the underneath position was smaller than the distance between the same points when the kiln was rotated so that they were in the top position. Stated differently, the readings indicated that the kiln was being bowed upward at this tire. The indicated adjustment of the rolls was then made until the strain gauge readings became approximately the same whether in the lower or upper position. After this adjustment of the rolls was made, the excessive wear at this point disappeared and the rolls and tire took on the normal, smooth appearance within a matter of a few weeks.

We thus became aware that we had a more precise tool for measuring kiln alignment than the transit, and we proceeded to check not only vertical alignment but also horizontal alignment at all tires and make the adjustments which the strain gauge readings indicated were necessary. An illustration of the strain gauge is shown in Fig. 1, and Figs. 2 and 3 are sketches showing how the gauge is applied to the shell near a tire.

*Project Engineer, Missouri Portland Cement Co.

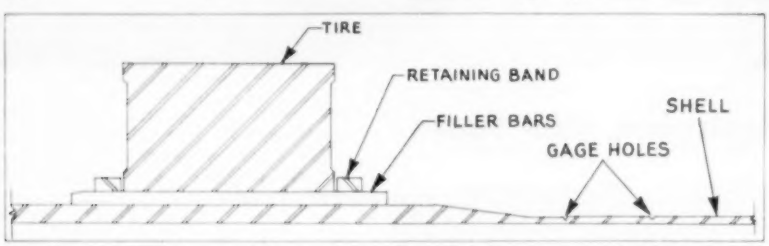

Fig. 2: Location of gauge holes near kiln tire. Sketch shows section through shell at tire

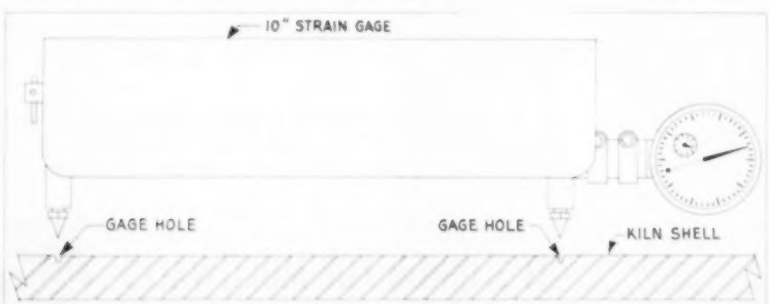

Fig. 3: Showing how strain gauge is applied to holes in kiln shell

How Strain Gauge Is Applied

A great deal of care should be taken in making the gauge holes. The holes need only be deep enough to set the points of the strain gauge, but must be free of all burns so that the points set themselves in the same place every time. After experimenting with different drills, a machinist $\frac{1}{16}$-in. combination drill and countersink is now being used.

As the strain gauge is sensitive to temperature changes, the kiln should be cold and the weather constant or at least the temperature recorded and readings corrected. Before this was realized, readings were obtained which showed a definite pattern but which were not consistent enough to be useful. Once the gauge holes are properly drilled and reamed, however, it is a simple matter to obtain the readings and, with a little practice, it is believed that the checking of the alignment of a kiln can be made by this method with no more trouble than by use of the transit. The strain gauge method has the added advantage that it will detect misalignment that is of a smaller order than can be found with the transit.

Acknowledgment is due L. A. Wagner, director of engineering and research, who suggested the application of a Whittemore strain gauge for testing kiln alignment as described in this article.

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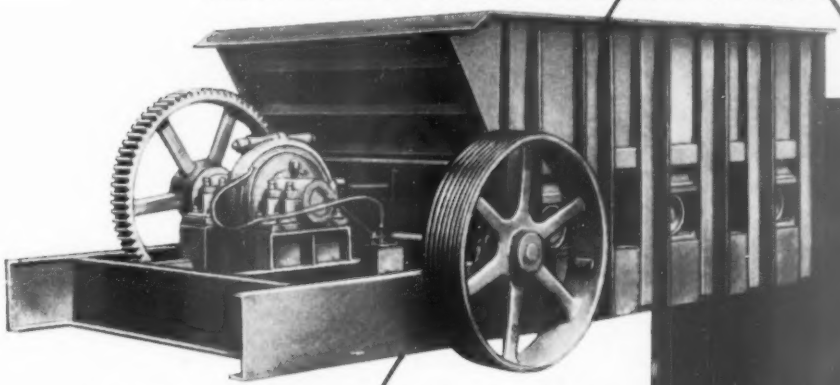

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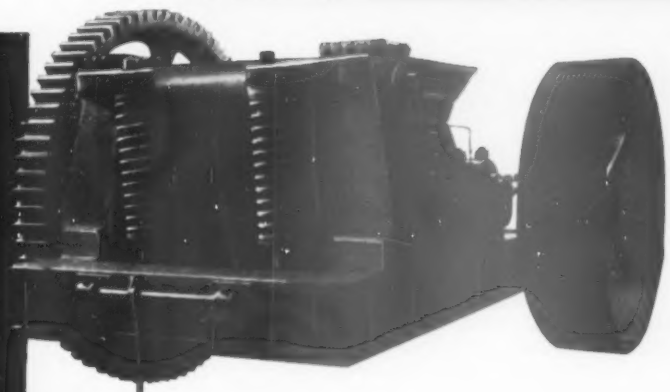

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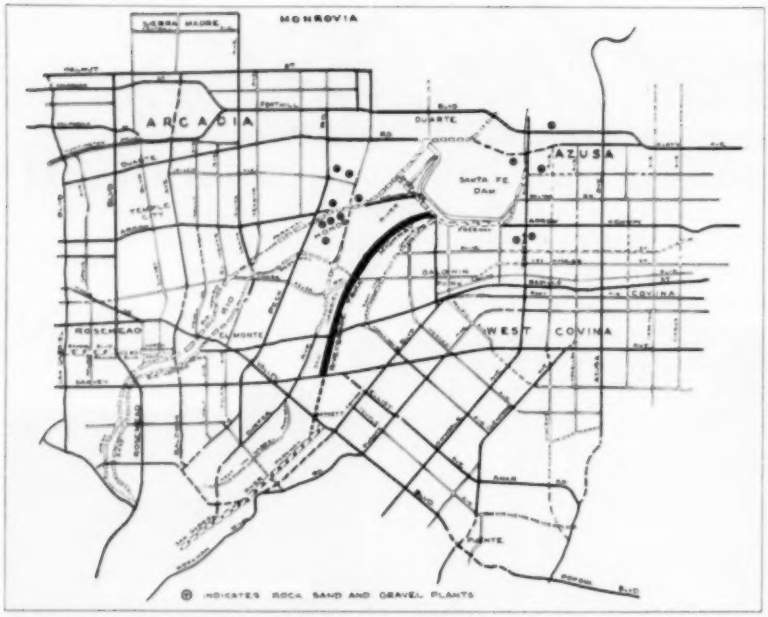

Map showing public highway (heavy black line) constructed to avoid city traffic in southern California suburban area

Build Short-Cut Truck Road

Southern California producers improve public relations by working for construction of by-pass truck route to remove gravel and other heavy trucks from main highway

DURING THE PAST FEW YEARS the spectacular growth of Southern California and of Los Angeles County in particular has required larger and ever larger production of rock, sand and gravel to meet the demands for building and construction.

The members of the Southern California Rock Products Association have met this challenge with the construction of the most modern plants for the production of these aggregates and great fleets of trucks and trailers to transport the finished products to the point of use.

In the San Gabriel Valley, to the east of Los Angeles, where the great gravel deposits of the San Gabriel River debris cone are located, 13 plants are producing in excess of 9,000,000 tons of aggregates each year, 90 percent of which must be transported by trucks.

As this tremendous demand for sand and gravel grew, and the communities through which the aggregates had to be hauled improved rapidly in residential and business development, the producers were faced with the serious problem of truck traffic. The plants on the west side of the San Gabriel cone used Peck Road for all movements to the south and southwest, while the plants on the east side of the cone used Irwindale avenue and the Baldwin Park district for materials destined to the same areas. The traffic of trucks and truck-trailers on Peck Road sometimes reached a peak of 240 vehicles per hour.

The residents and business people of the area traversed by these trucks were patient and cooperative when they found out that their civic organizations were meeting regularly with the representative of the Southern California Rock Products Association in an effort to solve this problem and relieve the traffic condition.

These meetings started several years ago and many suggestions, such as alternate routes, were made; but this simply meant taking the traffic off of one street and putting it on another—it was no solution. Finally the members of the Southern California Rock Products Association came up with the suggestion that the only true solution would be to build a new highway for trucks, especially constructed as to type and location. Yes! But where and how!

Truck Route Eliminates Congestion

It was then that the county supervisor for the area, Herbert Legg and the county road commissioner, Sam Kennedy were called in for consultation. Supervisor Legg secured the funds for a preliminary survey of a route suggested by Engineer Kennedy which would locate a truck highway on the west bank of the San Gabriel River in the Los Angeles County flood control channel. This would provide a 3½-mile straight route with only one stop through an area which was not developed or populated. The

(Continued on page 154)

Ribbon-cutting ceremony at the opening of the River Grade Truck Highway on May 11. Foreground, left to right: Bill Sprotte, engineer, Los Angeles County Road Department; H. G. Feraud, executive secretary, Southern California Rock Products Association; Gene Biscailuz, sheriff of Los Angeles County; Sam Kennedy, Los Angeles County Road Commissioner; Herbert C. Legg, supervisor of Los Angeles County; Mrs. Peggy Milne of El Monte Chamber of Commerce; and E. Q. Norman, vice-president, League of Civic Associations of Upper San Gabriel Valley. In the background are ten trucks and trailers loaded with sand and gravel which roared through the new highway after the ribbon was cut

Scalping-Crushing

COLONIAL Sand and Stone Co., Inc. *uses*

Washing-Sizing

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TELSMITH Equipment in this Plant

Two 5′ x 14′ Two-Deck Heavy-Duty Scalping Screens

Two 48-S Gyrasphere Crushers

Eight 4′ x 10′ One-Deck Vibro-King Dry Screens

Four 4′ x 14′ Two-Deck Vibro-King Wet Screens

Four 60″ x 9′ Super Scrubbers

Eight 4′ x 10′ One-Deck Vibro-King Wet Screens

Two 4′ x 12′ Two-Deck Pulsator Rinsing Screens

Fourteen Field and Plant Conveyors—18″, 24″, 36″, 42″ wide; total length about 3000′

Nineteen 24″ x 15″ Special Tunnel Gates

● COLONIAL of NEW YORK CITY and LONG ISLAND own and operate this modern all-steel sand and gravel plant. Designed in close co-operation with Telsmith engineers, plant layout and machinery is of the latest type, properly co-ordinated and balanced for flexibility and capacity, with interlocking features to assure smooth, trouble-free operation.

Production averages about 1000-1200 tons per hr., making four kinds of material: minus 1½″ plus ¼″ crushed and uncrushed gravel mixed, minus ¼″ plus ⅛″ grits, minus ⅛″ sand, all washed; and minus ⅛″ dry sand. Most of the material is loaded into barges for shipment to New York. A truck-loading plant handles local demands.

In Scalping-Crushing Unit, two 2-deck Pulsators are in closed circuit with two 48″ Gyrasphere Crushers which reduce all gravel to minus 1½″. In the Dry Screening Plant eight special Vibro-King Dry Screens produce the dry sand. Scrubbing-Washing-Sizing Unit has two batteries of Vibro-King Wet Screens—two-deckers ahead, with single-deckers following the Super Scrubbers. Get Bulletin 266 describing Telsmith Complete Plant Service.

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Officers elected for the 1953 term are, left to right: D. K. Shroyer, H. E. Millard Lime & Stone Co., Annville, Penn., vice-chairman; Leonard S. Fry, Fry Coal & Stone Co., Mercersburg, Penn., chairman; and H. H. Wagner, secretary. H. M. Binkley (not shown) is treasurer

Pennsylvania Agstone Meeting

THE AGRICULTURAL LIMESTONE DIVISION of the Pennsylvania Stone Producers Association held its annual meeting March 27, 1953, in Harrisburg, Penn. The convention was opened with a meeting of the board of directors, followed by the annual business meeting, with the general membership meeting being held in the afternoon.

At the business meeting, the following officers were elected: Leonard S. Fry, chairman; D. K. Shroyer, vice-chairman; H. H. Wagner, secretary; and H. M. Binkley, treasurer. Elected to the board of directors were: Ivan M. Martin and Fred Roberts, eastern section; W. O. Faylor and Glen Hawthorne, central section; and P. E. Heim and Herschel W. Lamb, western section. The following committees were also appointed for the 1953 term: scholarship and award committee, consisting of William Gerhart, chairman, William Faylor, P. E. Heim and Glen Hawthorne; membership committee, composed of Fred Roberts, Galen Detwiler, Lewis Nauss, D. K. Shroyer and Neil Van Buskirk.

William Gerhart, chairman of the scholarship committee, reported that, of the $600 which was made available for scholarship purposes, $400 had been used, of which $300 was awarded to students in the agronomy department of Pennsylvania State College, and $100 to a student at the National Agricultural College, Doylestown, Penn.

Nominating committee was composed of, left to right: Neil Van Buskirk, Faylor Lime & Stone Co., Middleburg, Penn.; F. Edward George, Thomasville Stone & Lime Co., Thomasville, Penn.; and Lewis M. Nauss, The Carbon Limestone Co., Lowellville, Ohio

H. H. Wagner, secretary, read a letter from L. H. Bull, of the National Association of County Agricultural Agents, who suggested that the division purchase advertising space in their complimentary booklet which is to be distributed at the annual meeting of the County Agents Association. The suggestion was unanimously approved.

James H. Eakin, Pennsylvania State College Extension Service, discussed the use of the lime meter and the general lime requirements throughout Pennsylvania. He displayed colored maps and charts which indicated areas that needed considerable liming material to bring the soil up to a pH which would sustain useful vegetation. The charts indicated a wide band of northern tier counties that were considerably deficient in calcium and phosphorus. He pointed out other areas, principally in central and eastern counties, which showed no general deficiency of calcium, due to ample liming practices during the past several years. He stressed the need for periodic soil testing so that liming materials could be applied on needy soils rather than on those already sufficiently limed.

Fred Merkle, professor of soil technology, Pennsylvania State College, presented a series of slides showing plant and root growth in soils treated with varying amounts of calcitic and dolomitic limes of a certain fineness. Prof. Merkle stated that on the controversy of high dolomitic lime versus calcitic lime, he had no definite conclusions, but that he felt the main problem in general was one of getting the farmers to *use* more lime, and emphasized this point with the following quotation, "Don't put it off, put it on."

Other speakers included Glenn Miller, county agent, Lebanon County Agricultural Extension Service, who discussed the value of liming and illustrated his topic by relating some

(Continued on page 154)

Among those attending the agricultural limestone meeting were, left to right: H. W. Lamb, Grove City Limestone Co., Branchton, Penn.; Sam Omasta, assistant executive secretary of the National Agricultural Limestone Institute; Leonard S. Fry, Fry Coal & Stone Co., Mercersburg, Penn., chairman of the meeting; H. W. Lynn, Bethlehem Steel Co., Steelton Quarry, Steelton, Penn.; and Leon Myers, National Gypsum Co., York, Penn.

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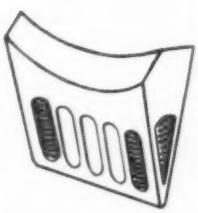
Because they are AMSCO "Wear-Sharp"* Repointers that stay sharper with use...

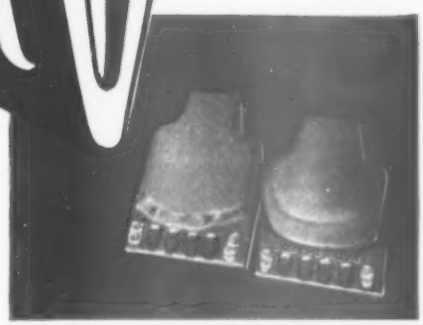
Service life plus! The combination of Amsco Manganese Steel and the hardness of AMSCOATING with Amsco Hardfacing electrodes—gives you a tooth that wears evenly and stays sharp longer.



Note that only certain grooves (shown in red at left) are Amscoated—the grooves on the outside and the one on each end. This is the area where ordinary teeth wear fastest. The hardened corners on the "Wear-Sharp" equalize wear along the entire cutting edge and eliminate rounded, blunted corners that cut digging speed and waste power.

Field reports indicate that "Wear-Sharp" repointers will give as high as six times the life of other teeth.

In these photographs at right of a typical case history, old repointers lasted from three to four days. Amsco "Wear-Sharp" repointers lasted 32 days—eight times the service life of the repointers previously used.



"Wear-Sharp" repointers installed on two dipper teeth showing condition of old teeth.

Dipper teeth after 257 hours of use with "Wear-Sharp" repointers used. New "Wear-Sharps" are ready for installation.

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Crushing Practice and Theory

Part XVI. Crusher operation in open and closed circuit compared. Advantages of surge bins and storage piles

By BROWNELL McGREW*

THE FACTORS GOVERNING the determination of capacity for any open-circuit crushing stage are much the same as those we outlined in connection with the secondary stage. In a properly designed crushing plant—excepting those plants which by-pass a portion of the pit-run around the head end of the flow line and inject this fraction back into the system at one of the reduction stages—the open-circuit tonnages decrease from stage to stage, because fractions of the flow which are finer than the setting of each stage are scalped off and by-passed around it. Sometimes finished-product fractions are taken off immediately after the primary, or secondary, stage and sent directly to the finished-material storage; this bleeding off of finished material may also be carried on at each scalping point in the flow line. These various possibilities in flow diversion, and re-entry, point clearly to the necessity for preparing a complete flow-sheet of the proposed plant before attempting to calculate the required capacity of any crushing stage. Only by doing this can we hope to approximate the requirements for the different stages.

The facts on which we base our flow-sheet must of course be reasonably accurate if the flow-sheet itself is to be of any value. Admittedly, the true facts are sometimes difficult, if not impossible, to compile for a new operation. This is quite likely to be the case in opening up a new gravel deposit, unless a very thorough, and costly, system of development work is conducted before the plant is designed. Another unpredictable factor is that of the market for various sizes of product. It is a factor which has a very direct and marked influence upon the flow-sheet, particularly upon the amount of work to be accomplished in the reduction crushers.

These uncertainties all indicate quite definitely the need for flexibility in the design of the crushing plant, especially those plants designed for the production of commercial aggregates, and this need is probably more important as regards the reduction crushing stages than anywhere else in the flow-sheet. The attainment of this flexibility does not necessarily entail the installation of an abnormally high amount of excess capacity, over and above the figures indicated by the flow-sheet calculations. If the plant is arranged so that reduction-crushing capacity can be added conveniently, as and if required, we have the flexibility we need, and the margin of capacity to be provided in our selection of crushers need not greatly exceed the predicted maximum as determined from the flow-sheet.

We can very seldom pick a crusher, or a battery of them, that will have exactly the rated capacity to match our calculated requirement for any given stage; and if we could do so it would not be sound practice to hew that close to the mark, because it is not practicable to maintain a crushing stage at its full-rated capacity 100 percent of the time. If we have an ample surge storage ahead of the stage to insure continuous feed we need only compensate for decrease in capacity due to mechanical causes. From 10 to 15 percent should take care of this.

Closed-Circuit Reduction-Stage Capacities

Thus far we have considered open-circuit crushing through the several reductions in a multi-stage plant. Very rarely are we able to turn out a finished product without closing the flow-line circuit somewhere along the line. Without going into any argument for or against closed-circuit crushing in any of the various stages, let us examine just what effect closing the circuit will have upon the required capacity for any particular stage.

Consider, for example, a single gyratory crusher of any type, arranged to operate in closed circuit with a vibrating screen, and set so that 70 percent of the original feed will be crushed to a size that will pass through the screen openings. Also, for the sake of simplicity, let us assume that the screen will take out *all* of this 70 percent undersize, i.e., will perform at 100 percent efficiency. Then, for each 100 tons of original feed to the crusher, 70 tons will pass on as finished product, so far as the stage we are considering is concerned, and 30 tons will return to the crusher, on the first pass.

Now, we have to make another assumption, which probably is not strictly in accord with actuality, but seems to be close enough to the mark to suit all practical purposes: we assume that the material returned to the crusher in the first, or any succeeding, pass will be processed in exactly the same fashion as the original feed, i.e., crushed to the same percentages of undersize and oversize. On the basis of this assumption, we would crush 70 percent of the 30-ton fraction to finished size, returning 30 percent, or 9 tons, to the crusher. At the next pass we obtain from this 9-ton fraction, 6.3 tons undersize, and 2.7 tons oversize. The process can be worked out by simple arithmetic to a fairly close approximation by calculating three or four passes; but it will be evident to the mathematically-minded that a simple convergent geometrical series is involved, which can be expressed by the formula:

$$T = \frac{100}{1-R} \qquad (1)$$

where T = total load, and R = proportion of over-size in crusher product, expressed as a decimal.

For the problem outlined, this formula sets up as follows:

$$T = \frac{100}{1-.3} = 142.9 \text{ tons}$$

Thus, whereas we are dealing with only 100 tons of original feed, we must for the closed-circuit operation, set up crushing capacity for at least 142.9 tons, or 42.9 percent circulating load.

Screen Efficiency Factor

It should be noted that formula (1) is applicable only for 100 percent screen efficiency, something that is rarely, if ever, achieved in practice. So, to put the formula in more usable form, we must insert another factor to compensate for screen efficiencies below 100 percent. To illustrate why this is necessary, assume a screen efficiency of 90 percent for the problem just discussed. Then, on the first pass, the screen would reject, as oversize, $30/.9 = 33\frac{1}{3}$ tons; and this same differential would apply to each succeeding pass. The revised formula takes the following form:

$$T = \frac{100}{1-\frac{R}{E}} \qquad (2)$$

where E = screen efficiency, expressed as a decimal.

Our problem now appears as follows:

$$T = \frac{100}{1-\frac{.7}{.9}} = 150.3 \text{ tons}$$

which indicates a circulating load of 50.3 percent.

To present in convenient form values derived from formula (2) we have prepared Table 1, herewith, showing theoretical circulating loads, expressed in percentages of the original feed. The table covers a wide range of oversize percentages in the crusher product, and several screen

(Continued on page 150)

*Allis-Chalmers Manufacturing Co., Los Angeles, Calif., district office.

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Crushing

(Continued from page 128)

efficiencies. It is broad enough to cover almost any combination of conditions that might be encountered in actual practice.

How Much Circulating Load?

In designing a closed-circuit crushing stage, the question of how much circulating load should be carried is a very important one. It not only has a direct bearing upon the capacity of the stage; it determines the amount of screening surface, and the elevating capacity necessary to handle the load in the circuit. There is no "blanket" answer to this question. It must be analyzed for each case, on the basis of the operating characteristics of the particular size and style of crusher that is being considered for the job.

Usually, when we set up a closed-circuit crushing stage, we want to get as many tons of finished material from it as possible or, conversely, we want to do the required job with as little outlay for crushers and screens as possible. We know the size of product the stage is to turn out, and we should know, to a fairly close approximation, how many tons of original feed are to be processed, and the size of this feed. Having this information we can, with the aid of the product tables and curves, and the circulating load table—or formula—analyze the problem for any crusher, or battery of crushers.

To illustrate how the analysis is made, as well as to demonstrate why the optimum setting may vary for different types of crushers, or for different sizes of the same type, the following examples have been worked out for two product sizes, using the Type "R" A.-C. crusher as our exemplar.

Assume, for example, that we are to crush a material, in a closed-circuit crushing stage, to pass a ¾-in. square opening (as determined by a flat testing sieve); that our screen, which forms a part of the circuit, will be fitted with the proper size of openings to make this ¾-in. product, and will be capable of performing at 90 percent efficiency. Also assume that the material is such that the crusher selected will crush it to a size, 70 percent of which will pass a square-opening test sieve equivalent to the close-side crusher setting. (We determine this either from tests made on the material, or from the table of approximate values presented in a foregoing section.)

TABLE I: CIRCULATING LOADS

Percent Oversize in Crusher Product	Screen Efficiency						
	100%	95%	90%	85%	80%	75%	70%
5	5.3	5.7	5.9	6.3	6.7	7.1	7.7
10	11.2	11.8	12.6	13.3	14.2	15.4	16.8
15	17.7	18.8	20.0	21.5	23.1	25.0	27.5
20	25.0	26.7	28.4	30.7	33.4	38.3	40.0
25	33.4	35.8	38.7	42.0	45.4	50.0	55.5
30	42.9	46.3	50.3	54.7	60.0	66.7	74.5
35	53.9	58.5	63.8	70.0	77.8	87.7	100.0
40	66.7	73.0	80.0	89.0	100.0	114.3	133.5
45	81.8	90.5	100.0	112.5	128.5	150.0	181.0
50	100.0	111.4	125.0	143.0	166.7	203.0	250.0
55	122.2	137.5	158.0	183.5	219.5	276.0	365.0
60	150.0	172.0	200.0	240.0	300.0	400.0	600.0
65	186.0	216.0	261.0	326.0	435.0	652.0	1290.0
70	233	280	351	568	700	1416.0	
75	300	374	498	747			
80	400	537	802				
85	567	852					

Using this 70-percent value as a basis, we first set up, from the product curves for screened feed, herewith, a column of percentages that can be expected to pass the ¾-in. opening, using as many trial crusher-settings as we wish (usually three or four will suffice). This column should be set up opposite the corresponding crusher settings, along with another column showing the capacity ratings, of the particular machine under consideration, at each of these settings.

Having tabulated this information, we consult our table of circulating loads—or use formula (2)—and list a fourth column of figures, showing the percentages of circulating loads which can be expected on the basis of the values in column 3, and for 90-percent screen efficiency.

A final calculation is now performed to arrive at the amount of *original feed* which, when added to the circulating load, will equal the capacity rating of the crusher at each trial setting. The formula for this calculation is:

$$\text{Tons of original feed} = \frac{\text{Capacity rating of crusher}}{1 \text{ plus (Circulating load expressed as a decimal)}} \quad (3)$$

The following tabulation shows

Crusher setting	Rating, in tons/hour	Percent passing ¾-in. opening	Percent circulating load	Tons/hour of original feed
No. 636 Crusher				
½ in.	64	95	6	60.4
⅝ in.	83	85	20	69
¾ in.	108	70	50	72
⅞ in.	124	60	80	69
No. 322 Crusher				
½ in.	36	95	6	34
⅝ in.	38	85	20	31.6
¾ in.	40	70	50	26.6
⅞ in.	42	60	80	23.4

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Crushing

(Continued from page 130)

how the problem works out for two sizes of the Type "R" crusher. It is interesting to note that the settings for maximum output, i.e., tons of original feed, are not the same for these two machines.

These figures indicate that maximum output may be expected from the No. 636 crusher at a setting equal to the product size, whereas, the No. 322 machine shows up best at ½-in. setting. If we wish to obtain this maximum performance from the larger machine, or from a battery of them, we must provide screening area sufficient to handle 1.50 times the original feed rate. For the smaller machine we need provide only 1.06 times the original feed rate.

Closed-Circuit Calculations

As a further illustration of the process, the following tabulation covers the calculations for three machines of the same type, in closed-circuit with screens fitted for ⅜-in. product, and operating at the same efficiency of 90 percent.

Crusher setting	Rating, in tons/hour	Percent passing ⅜-in. opening	Percent circulating load	Tons/hour of original feed
No. 636 Crusher				
⅜ in.	36.5	85	20	30.2
⅝ in.	44	70	50	29.3
½ in.	64	52	138	27.0
No. 436 Crusher				
¼ in.	38.2	90	13	33.8
⅜ in.	49.8	85	20	40.5
⅝ in.	62.4	70	50	40.5
½ in.	78.5	52	138	33.0
No. 322 Crusher				
¼ in.	14	90	13	12.4
⅜ in.	16	85	20	13.3
⅝ in.	22	70	50	14.7
½ in.	36	52	138	15.0

In each of the above cases we have carried the tabulation through to a crusher setting slightly in excess of the product size, and in one case (the No. 322 crusher on ⅜-in. products) the figures indicate maximum output at this plus-product setting. However, plus-product settings are not recommended for either standard gyratory crushers or reduction crushers of standard, or short, throw types, and figures for such settings cannot be considered as reliable. The reason this is so will be clear when we consider just what kind of particles constitute the circulating load in a closed-circuit system incorporating any crusher of the pressure type.

We have pointed out in a preceding section that a high-speed, short-throw crusher, such as the Type R or the Newhouse, will reduce practically all of its product to a one-way dimension not exceeding the close-side setting of the crusher; hence, in a closed-circuit operation, if the crusher-setting is anything less than the square-opening product size, practically all of the material will be crushed, *during the first pass*, to a size which is less than the screen opening, in at least one of its dimensions. Now, if all of the material were broken in cubical shape, and our screen operated at 100-percent efficiency, there would not be any circulating load for any minus-product-size crusher setting. It follows, therefore, that the entire circulating load, except that portion of it which is due to less-than-perfect screen efficiency, must consist of pieces that are more or less flat in shape. It follows, also, that these pieces will not be gripped by the crusher in any succeeding pass, unless they happen to fall in edgewise, and that most of them must be broken by being crushed between one of the crushing faces and some other particle of material. That they are so broken is evident; else the circuit would soon be choked with over-size pieces.

Most of the particles which have a one-way dimension smaller than the product size probably require only one crack to reduce them to under-size, because the break need only be made in one direction: through the small dimension. On the other hand, if the crusher is set to a plus-product size, the over-size "flats" must be shattered in two directions to reduce them to under-size. Theoretically, the amount of work that must be done on these plus-product-size flat spalls is at least triple that which is required to break down the minus-product-size spalls. When we consider that most of this over-size breaking must be accomplished by catching the pieces against another particle, or particles, we can see why our figures, which work out quite well for minus-product-size crusher settings, cannot safely be used for plus-product-size settings. The circulating loads, for such settings, are apt to be inordinately high, and there is nothing to be gained by running the crusher that way, except, perhaps, on extremely soft and easy-crushing material.

Whether or not it is advisable to set the crusher to a discharge opening equal to the product size depends upon the crushing characteristics of the material. If the material is friable, or if it cubes well, it is safe to assume that the crusher can be so set; on the other hand, if it is hard, or tough, or tends to slab in the crusher, the setting should be held to a maximum of 80 to 85 percent of product-size, regardless of what our figures indicate in the way of capacity for any coarser settings.

"Stage-crushing," as we use the term here, applies to open-circuit reduction in a flow line comprising two

(Continued on page 134)

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this new Ford Truck is it! New "DRIVERIZED" Cab cuts driver fatigue. New easy handling saves work and time getting around in tight spots. These and many other TIME-SAVING features in the all-new Ford Trucks help get jobs done fast.

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FORD *ECONOMY* TRUCKS

SAVE TIME! SAVE MONEY! LAST LONGER!

Crushing

(Continued from page 132)

or more crushing stages, with scalping between each stage, but without close-circuiting any stage upon itself—except, perhaps, the final one. Generally speaking, such an arrangement works out more efficiently than one in which each stage is run in closed-circuit. There is nothing to be gained by sending oversize rock back to the crusher that let it go through once, unless the stage is the final "clean-up" stage in the flow line. The oversize should go on to a stage wherein the setting is smaller, and where these oversize pieces will be crushed by positive metal-to-metal contact. The scalping between stages in such a system should remove most of the material which is smaller than the setting of the next following stage.

Stage-Crushing vs. Closed-Circuit Crushing

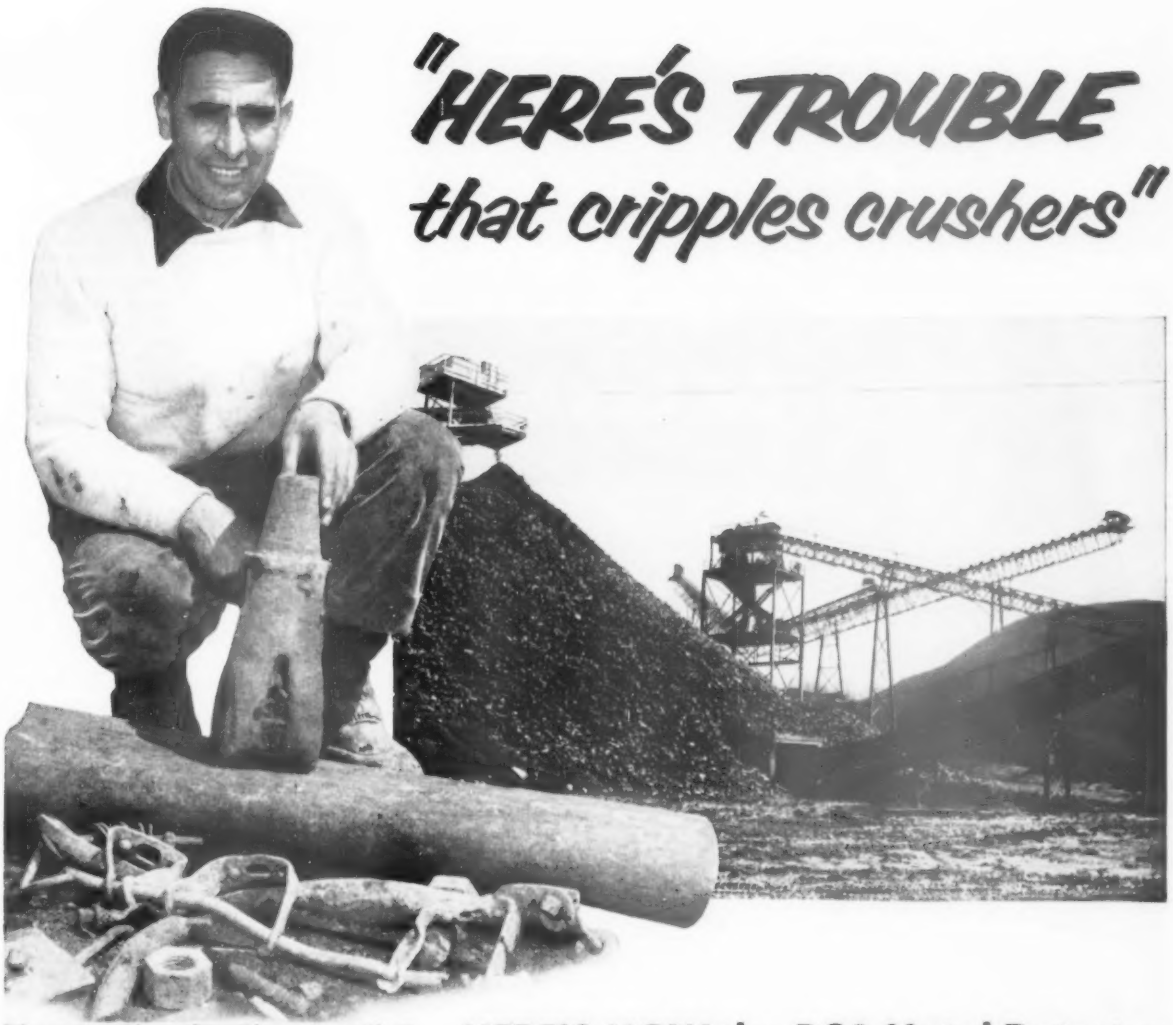
This open-circuit, stage-crushing system is an excellent arrangement for the commercial crushing plant, because it tends to minimize production of fines, especially so if the ratio of reduction, per stage, is held within moderate limits. The system can be carried out to a point where relatively little tonnage need be handled in closed-circuit, as has been exemplified in a number of plants during recent years. As an example: a plant is running, let us say, with a final, close-circuited stage that is taking an original feed of about 100 tons per hour, with a circulating load of about 25 tons per hour through this stage. If a small "clean-up" crusher is installed to handle the 25 tons oversize—this machine being set somewhat finer, of course, than the larger machine—the circulating load through this smaller crusher can generally be held within 5 tons per hour, and the feed rate to the former final-stage can be increased by the amount of the circulating load which has been removed from it. This practice of adding "clean-up" crushers to an existing flow-line is becoming increasingly popular, particularly where the demand for smaller sizes of product has been throwing a heavy strain on existing equipment.

Open-circuit, stage-crushing is equally well adapted to the preparation of feed for grinding mills. For such service the reduction per stage need not be limited with a view to minimizing fines; otherwise, the design factors are much the same as for the aggregates plant.

Nothing that we have said here should be construed as antagonistic to the closed-circuit, crushing-stage, which is a very necessary adjunct to most minerals-reduction plants. What we are trying to convey is the fact that material which has been through a pressure-type crusher once can be processed more efficiently, for further reduction, in another crusher, or

(Continued on page 136)

"HERE'S TROUBLE that cripples crushers"



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Crushing

(Continued from page 134)

crushers, with smaller discharge setting; and, that circulating loads should be held to a minimum by carrying the stage-crushing system through to its logical limit.

Surge Storage

We have commented on the influence of surge storage upon plant operation several times in the preceding discussions. The provision of adequate surge storage at the right places in the flow line is of sufficient importance to warrant a little further consideration.

It is desirable, in the crushing plant, as it is in any production process, to achieve a smooth and uninterrupted flow through the plant so that the reduction crushers and sizing screens will be operating at all times under uniform load conditions, and at full capacity. It is not always possible to feed the plant in this manner; a smooth flow of feed to the primary crusher is the exception, rather than the rule; therefore, if we are to smooth out the flow in the plant itself we must have elasticity in our flow line, and the logical way to obtain it is to provide surge storage ahead of each crushing stage. We can, of course, get around this by providing enough crushing capacity to absorb the peaks, but this method is expensive; also it throws a variable load on the screens; and screens do not perform at maximum efficiency under such a load.

While the case for an ample surge storage is clear cut enough, the question of just what constitutes an adequate storage is not always an easy one to answer. It is difficult to visualize beforehand just how smoothly a projected scheme of quarry or pit operation is going to function, and impossible to forecast accidental delays in loading, transportation, and feeding. About all we can do is to rough out our plan of operation, and allow a comfortable margin for contingencies. For example, if it is calculated that one trainload of rock will be delivered to the plant each one-half hour, on the average, and our primary crusher has been chosen with a view to getting this train through in ten minutes, then we must, obviously, either provide stage crushing capacity to match the high capacity of the primary or, if we want to get the most work out of our investment dollar, set up a surge capacity in the plant to absorb the peak load and feed it through the plant steadily over the entire 30-minute cycle. That is the essence of the problem: to keep as many as possible of the plant units running under uniform load and at full capacity.

As an example of one extreme in the requirement for surge capacity we have those plants whose primary (and, possibly, secondary) units operate only one shift of eight or ten

(Continued on page 138)

"Bedeviled Copper" helps to build a battleship

● The hard, ductile, malleable metal known as NICKEL derives its name from "kupfer-nickel", meaning *bedeviled copper,* a name given it by superstitious medieval Saxon miners. These miners, in uncovering what appeared to be a fresh lode of silver ore, thought the devil of the earth, *"Old Nick",* had cast a spell over their ore since it could not be hammered into useful articles . . . *and it was several hundreds of years later that Cronstedt's discovery led to the actual recognition of nickel.*

Among the thousands of ways in which nickel now serves man is in the construction of a modern battleship—where this versatile corrosion-resistant metal is used in armor plate, gun tubes, and scores of other ordnance, navigational and communications material.

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Thus, through the 20 SYMONS *Cone Crushers at "Inco" mines passes the majority of nickel used today . . . one more example of a job well done by* SYMONS *Cones.*

C652

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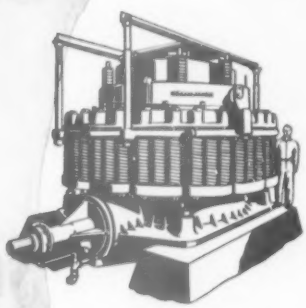

● *SYMONS* Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter —in capacities from 6 to 900 tons per hour.

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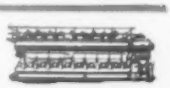

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Crushing

(Continued from page 136)

hours per day, whereas the re-crushing and screening units run full time, or nearly so. The problem of calculating surge storage for such an operation is a simple one if operating conditions, such as character of feed and product size, remain unchanged, and if the feed rate to the primary units is fairly constant from shift to shift. Where all of these conditions are subject to significant variation the calculation is a more complicated one: we must calculate the requirement for each combination of conditions, and provide a surge storage that will take care of the maximum.

Regardless of how extreme the requirement for surge capacity may be it is usually unnecessary to provide an extensive storage ahead of more than one crushing stage. If the plant units are properly balanced the flow rate can be smoothed out by regulating the feed from this one point. This does not necessarily mean that mechanical feeders need be used to regulate the flow; the crushers themselves will do this for the succeeding stages of the plant if the stage at which the regulating is done is the "bottle-neck" in the flow line, i.e., the stage of least capacity. Naturally, this regulating stage should be as near the head end of the flow line as possible, and, if it were possible, or practicable, to achieve an "ideal" plant layout, each successive stage would have a capacity slightly in excess of the preceding stage.

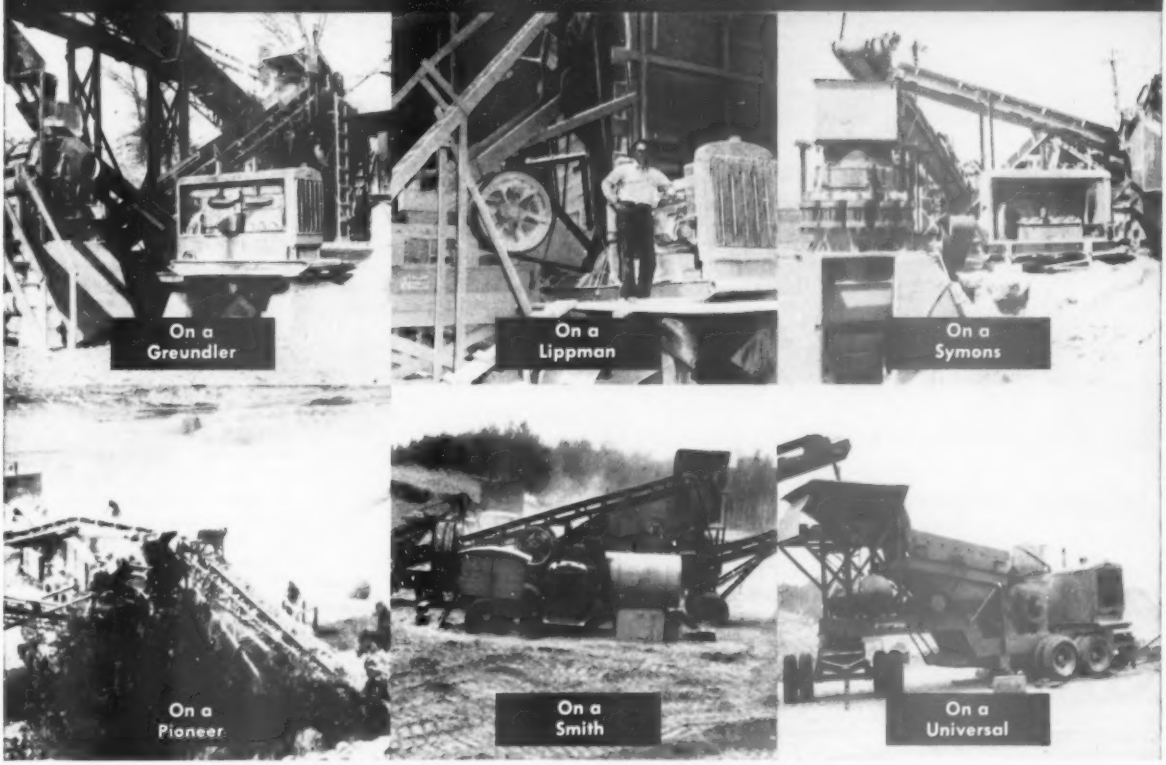
Any multi-stage crushing plant will have a "bottle-neck" stage, and it is this stage which establishes the production rate of the entire plant; therefore, it should be kept busy, and the only way this can be done, if the feed to the plant is a fluctuating one, is to provide sufficient surge storage ahead of it to absorb such fluctuations—at least, such as may be expected under normal operating conditions.

We have mentioned elsewhere that some operators of gravel plants have realized the desirability of incorporating in their flow line a surge storage of sufficient proportions to compensate for delays of considerable duration, such as might be caused by a major breakdown of the loading equipment. There is no reason why this same expedient cannot be applied in a quarry operation—following the primary, or secondary, crushing stage. Aside from the production insurance it affords, such a stockpile is an excellent point from which to regulate the feed to the reduction crushing stages and screens, by means of one or more mechanical feeders. With such regulation the need for surge storage at other points in the flow line is minimized.

Thus far we have discussed only that type of surge storage which lies directly in the flow line, a "series"

(Continued on page 140)

Your crusher will perform better with MURPHY DIESEL POWER



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storage, as it were. There is another type which can be utilized to advantage in certain operations, particularly in those gravel-pit operations where the gradation of the pit-run material is subject to considerable variation. This type of storage might be called the "bleeder" system, inasmuch as it consists of drawing off an intermediate size, or sizes, of product the amount of which, at any time, runs in excess of the capacity of the reduction crushers. Then, during periods when the pit-run material is running to fines, this storage is drawn upon to keep the reduction crushers busy. This is an excellent system for smoothing out plant production, especially in those plants which intermittently run heavily to the production of fine sizes of crushed rock. It is difficult to forecast the requirements for such a system; the application can best be made in a going plant where the operator knows his pit and his requirements for certain sizes of product.

(This ends the series, which was begun in June 1950—EDITOR.)

Rocky's Notes

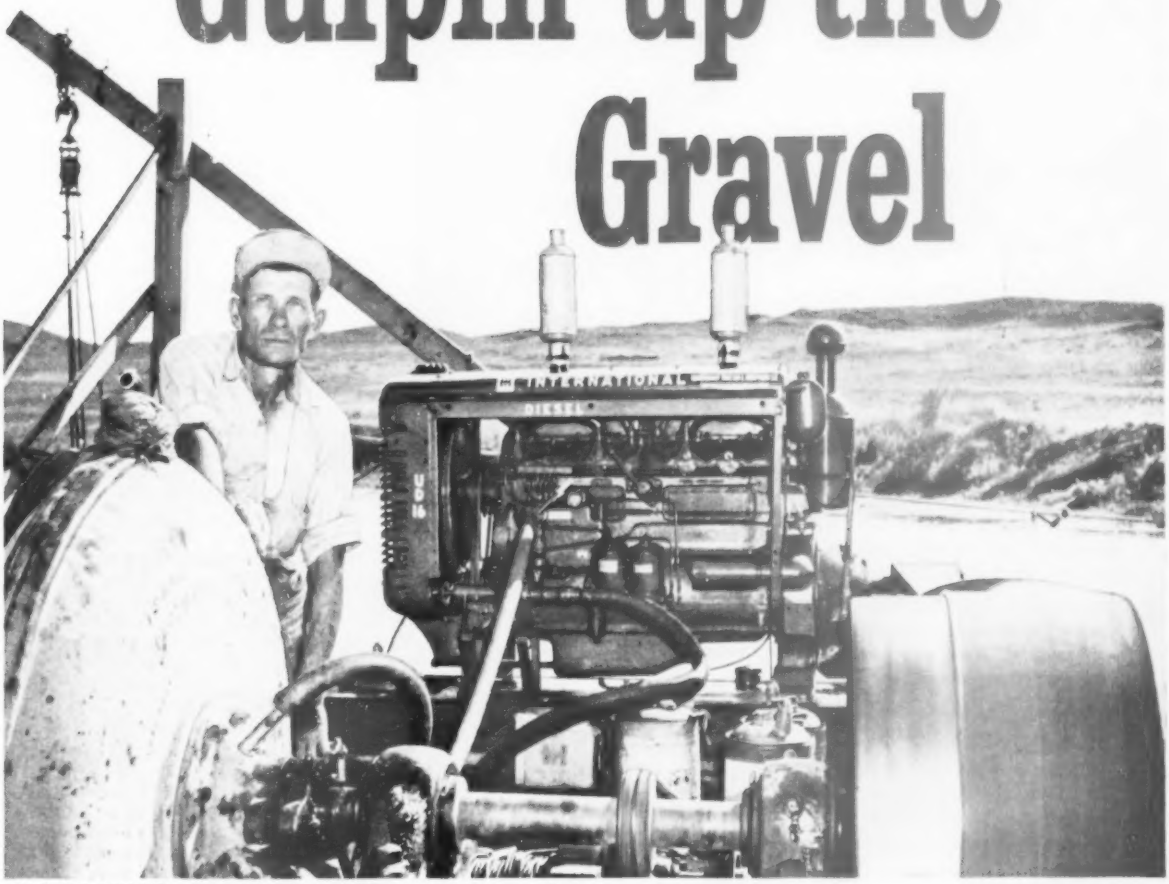
(Continued from page 73)

with a textbook such as the one by Wilder D. Bancroft, "Applied Colloid Chemistry"[1], published in 1921. Of course it is out of date—the first edition which we have—but it does show the easy beginnings of the science. Another good beginner's text is "An Introduction to Theoretical and Applied Colloid Chemistry"[2], by Dr. Wolfgang Ostwald, translated into English by Dr. Martin H. Fischer, published in 1922. Dr. Ostwald, specifically included the hydration and setting of portland cement as a colloid phenomenon. About this time there were established at regular intervals National Symposiums on Colloid Chemistry,[3] the proceedings of which were published in book form. One we have, containing the 1927 symposium, has several papers relating to geochemical subjects, including portland cement.

This particular volume is of special interest to us now because it contains an introductory chapter by Dr. H. R. Kruyt, whose works have recently been translated from Dutch to English. We will refer to his most recent text book later on. In this introductory chapter, when the science was young, Dr. Kruyt said: "What is the aim of sciences? Not only to *know* but more to *understand* nature; and we understand a phenomenon only when we recognize logic in it. So in science we try to discover logic in the behavior of matter. We meet every moment with phenomena which at first sight seem to be contradictory; then we try to reconcile them, i.e., to raise the problem to a higher level, where the contradiction dissolves to a higher unity. We cannot be content as long as we have not found this unity, and therefore we are con-

(Continued on page 142)

Gulpin' up the Gravel



PAYTON'S PLEASED with how economical UD-16's are to run. *"In producing 350 cubic yards of gravel in a ten hour day, our UD-16 uses only 25 gallons of diesel fuel, and not enough oil to mention,"* says veteran operator John Payton.

HALFWAY 'CROSS THE CALAMUS. On a typical job like this, International's UD-16 engine powers the pump sucking a cubic yard of gravel every 1¾ minutes from a 25-foot depth, pushing it 100 feet to the bank, with a 30-foot lift to the screen.

International performance means production at a profit for Nebraska operator

Milan Gayman Sand and Gravel Company, North Platte, Nebraska carries out its highway gravel contracts with ease.

With International UD-16 diesel engines for power, the pumps suck up approximately 350 cubic yards of gravel a day from the Calamus River bottom.

Operator John Payton is sold on International power:

"Our UD-16 sure's a good engine for pump operations. My boss has two of them, and they sure are producers. Easy to start, pack plenty of power, are economical—and best of all—they never give me downtime trouble. I don't think Internationals can be beat by any engine made!"

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tinually pursuing that goal." It would appear that cement and concrete researchers have been content "with phenomena which at *first sight* seem to be contradictory;" in other words, after 50 years or more they haven't yet got their "second sight."

Dr. Kruyt's latest work, sent to us for review, is "Colloid Science—I, Irreversible Systems, Hydrophobic Colloids." To show how the science has developed, need we say more than that this book contains five pages of symbols that must be mastered before one can fully understand the text—including the whole Greek alphabet. Probably a mere listing of the chapter heads will be enough to explain the scope of this book: (1) General Introduction—Historical, etc.; (2) Phenomenology of Lyophobic Systems; (3) Optical Properties of Colloidal Solutions; (4) Electrochemistry of the Double Layer; (5) Electro-Kinetic Phenomena; (6) The Interaction Between Colloidal Particles; (7) Kinetics of Flocculation; (8) Stability of Hydrophobic Colloids and Emulsions; (9) Rheology of Lyophobic Systems.

Since most of the colloids encountered in cement and concrete are not lyophobic (hating liquids), but lyophillic (loving liquids), it may be concluded that there is not much of direct interest in the book for researchers in this field. However, that is not a safe conclusion regarding this work or any other on the fundamentals of colloid science, because one never knows when he will meet up with facts or theories which do fit into his research. Some air-entraining agents used in cement and concrete, for example, are hydrophobic, and they are colloids. Hence, how are we going to know their real function in concrete without all available knowledge about the properties of such colloids? Increasing the flowability (or decreasing the viscosity) of cement raw material slurries, of concrete mixtures, etc. by use of various admixtures directly involves application of colloid science, as does the flotation processes for beneficiating cement raw material slurries.

Another new book on the general subject, one which we have referred to before on this page, is "Colloid Science", by Dr. James W. McBain. This is a little more readable but not very specific on those branches of colloid chemistry related to geochemistry with the exception of a chapter on clays. Here the reader may find a graphical presentation of the structure of clays much more complete than in the article on "Prospective Chemistry of Cement and Concrete" elsewhere in this issue of ROCK PRODUCTS. The following statement by Dr. McBain seems to us of special interest: "Deep shales (compacted clays) have most of the planar [between the layers] water pressed out by weight of the overburden, and frequently cause much trouble

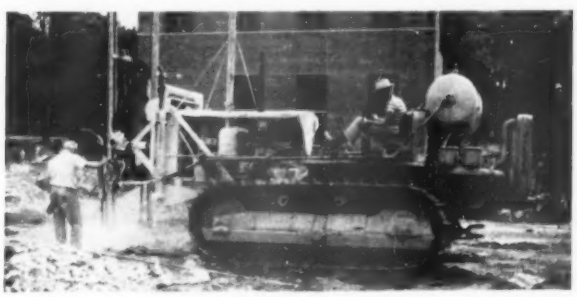
(Continued on page 144)

75 cfm puts full wallop in a heavy duty breaker.

With 125 cfm these tools do 30% 40% more work.

Three 365's — enough capacity for 4 heavy wagon drills.

More Jaeger air speeds many jobs, such as line testing.



Tractor mounted and powered, operates two big drills.

Ample air for heavy pile hammers, with a Jaeger 600.

Only JAEGER has built thousands of air compressors in "new standard" ratings . .

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Any compressor that produces 15% to 25% more air than others, without racing, overheating or vibration, must be engineered to higher standards.

Jaeger, alone, has engineered these new standards into thousands of compressor units, whose design features are not found in any other line of portable compressors, *old or new:*

- Balanced 2-stage "W" type compressor in every model from 75 to 600 ft.
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- Positive force feed lubrication, standard.
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- Bigger clutches than any other compressors; bigger engines operating at conservative speeds.

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THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

Pumps • Concrete Mixers • Truck Mixers • Aggregate Spreaders • Concrete Spreaders and Finishers

Rocky's Notes

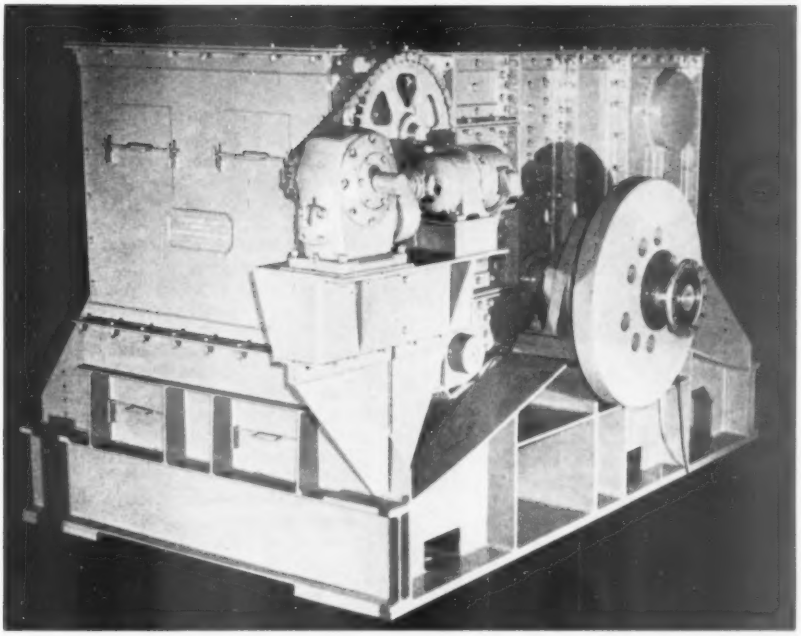
(Continued from page 142)

in tunneling and in drilling operations because they swell by absorption of water from drilling mud or from the surface when exposed. Such clays are called 'heaving shales.' Calcium or other polyvalent ions minimize this effect." It would seem from this that free calcium ions in concrete solutions might be helpful in controlling such expansion when met with in concrete aggregate. In other words, it is possible for a shalely aggregate to be better in concrete than tests of the aggregate alone would suggest.

Of perhaps more specific interest is a new book "The Surface Chemistry of Solids,"[5] by Dr. S. J. Gregg. This treatise brings out the point that surface chemistry is not confined to particles as small as colloids, but to all sizes of particles. Surface activity in the case of colloids is more recognizable only because such small particles have a great deal of surface in proportion to their net volume or weight. The articles that we have been writing on the chemical structure of feldspar and other silicate aggregates give the reasons why there is such a thing as surface chemistry, and how important it may be in any intelligent research on concrete and concrete aggregates.

A new book on "Surface Activity,"[6] by J. L. Moilliet and B. Collie, is a treatise on the "physical chemistry, technical applications, and chemical constitution of synthetic surface-active agents." Chapter headings are (1) Introduction; (2) The States of Solution of Surface-Active Agents; (3) The Absorption of Surface-Active Agents at Interfaces; (4) Fundamental Interfacial Processes; (5) Technical Wetting-Out and Waterproofing Processes; (6) The Preparation of Emulsions; Demulsification; (7) The Dispersion of Solids in Liquid Media; (8) Detergent Processes; (9) Some other Applications of Surface-Active Agents; (10) Anionic Surface-Active Agents; Sulphonic Acids and Their Salts; (11) Anionic Surface-Active Agents: Their Alipathic Sulphates; (12) Other Anionic Surface Agents; (13) Cationic Surface-Active Agents; (14) Non-Ionic Surface Agents; (15) Other Types of Surface-Active Agents. Thus it will be seen that the text is more concerned with organic colloids than with those encountered in inorganic or mineral chemistry.

A new book that should prove of much interest to many of our readers is "Colloidal Dispersions"[7] by Dr. Earl K. Fischer. Since cement raw-material slurries and mortar and concrete mixtures are at least to some extent colloidal dispersions, this book really discusses subjects vital to the industry. Chapter headings are (1) Introduction; (2) Particle Size; (3) The Solid-Liquid Interface and Wetting; (4) The State of the Dispersed Solid; (5) Rheological Properties of



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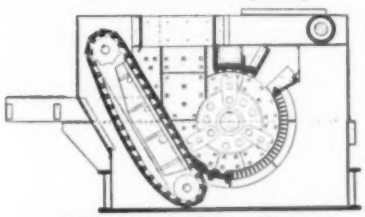
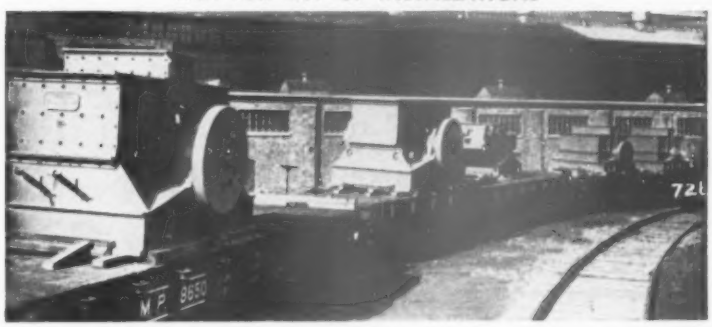


Ask for List of Installations

ASK FOR LIST OF INSTALLATIONS



We will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.

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Dispersions; (6) Surface-Active Agents; (7) The Process of Commutation; (8) Mixing; (9) Roll Mills; (10) Ball and Pebble Mills; (11) Disc, Cone, and Colloid Mills; (12) Dispersion by Phase Transfer and the Flushing Process. The chief subjects discussed are paint pigments and paint manufacture. Cement and concrete are not referred to but it is obvious that the text covers many processes similar to those involved in concrete practice.

Perhaps the greatest indictment of modern cement and concrete research which could be made is that none of these new books on colloid science so much as mentions any data related to cement and concrete, although as we have stated above, the pioneers of colloid science looked upon portland cement as one of their prize exhibits. There is a great deal about clays in the modern text books, for ceramic chemists and petroleum chemists in exploring catalysts for oil cracking have done a lot of profitable research in their fields, as have the explorers in pure sciences such as geochemistry and soil chemistry or agronomy. It remains for the majority of concrete researchers, apparently, to discover that such a science exists at all.

Textbooks Referred To

(1) Applied Colloid Chemistry; Wilder D. Bancroft, McGraw-Hill Book Co., 1921.
(2) Theoretical and Applied Colloid Chemistry; Dr. Wolfgang Ostwald; John Wiley & Sons, Inc., 1922.
(3) Colloid Symposium Monograph. Vol. 5, Chemical Catalog Co., 1928.
(4) Colloid Science, Vol. 1; H. R. Kruyt, editor; Elsevier Publishing Co., 402 Lovett Blvd., Houston, Tex., $11.00.
(5) Colloid Science; James W. McBain; D. C. Heath & Co. and Reinhold Publishing Corp., 330 West 42nd St., New York City, $8.00.
(6) The Surface Chemistry of Solids; S. J. Gregg; Reinhold Publishing Corp., 330 West 42nd St., New York City, $8.50.
(7) Surface Activity; J. L. Mollliet and B. Collie; D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City; $12.50.
(8) Colloid Dispersions; Earl K. Fischer; John Wiley & Sons, Inc., 440 Fourth Ave., New York City; $7.50.

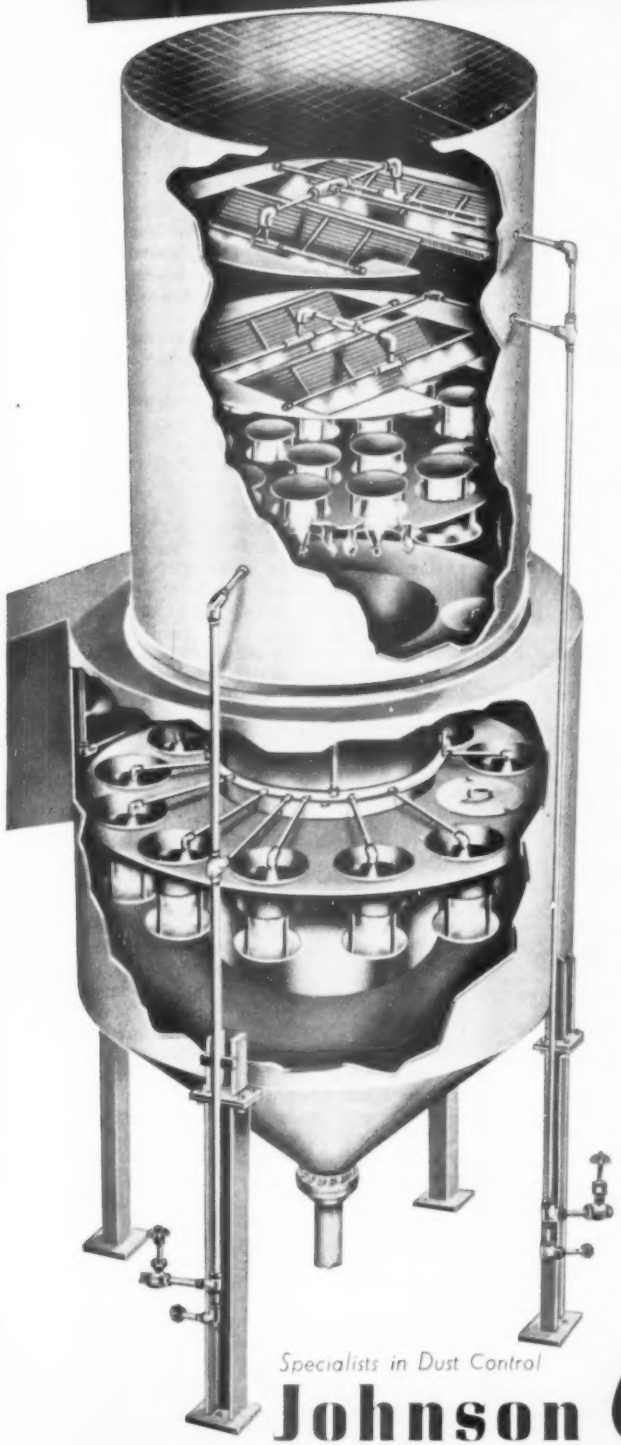
Preventing Rust

A 30-MIN., 16-MM., SOUND MOVIE, in color, on new ways to stop corrosion and reduce costs, has been released by Rust-Oleum Corp., Evanston, Ill. Entitled, "The Captain's Idea," the film portrays a story featuring the company's new roller-coating method which is claimed to save up to 30-40 percent on recoating wire fences, and a special animation section illustrating how the product penetrates rust to bare metal, incorporating the dust particles into the coating. Further information on the availability of the film may be secured by writing to the company at 2425 Oakton St., Evanston, Ill.

Cuban Cement Production

CUBA'S 6-KILN CEMENT PLANT produced 2,462,000 bbl. of cement during 1952. Imports of cement during the year comprised 230,000 bbl. from Europe and 137,000 bbl. from Puerto Rico.

stop air pollution



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Look at these Advantages...

- **Completely portable . . . easily assembled and relocated**
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Specialists in Dust Control

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Labor Relations Trends

(Continued from page 75)

the previous day, or because of customary expectation, it would seem clear that he is *'reporting-in'. 'To report-in' means to present oneself for duty*, according to Webster's Dictionary. To come at 5:00 a.m. is his duty in the circumstances that gave rise to this arbitration. By coming at 5:00 a.m. the employe is presenting himself for that duty. He is reporting-in.

"The employe is 'guaranteed' four hours at time-and-one-half. What does this mean? If the employe continues to work into his regular shift, does it mean that he is entitled to the four hours in addition to the eight of his shift? In the judgment of the arbitrator the section does not so state nor is there any necessary implication that it means four hours in addition to the eight of the regular shift.

"The Section specifically states that four hours at time-and-one-half must be guaranteed. When an employe starts at 5:00 a.m. and continues to work through his eight-hour shift, that is, actually works continuously ten hours, it seems clear that the guarantee of four hours' work has been satisfied.

"What is the employe entitled to? If he comes in at 5:00 a.m. and works until 7:00 a.m. he is entitled to two hours at time-and-one-half. He is further entitled to be paid at the rate of time-and-one-half (instead of at straight time) for the first two hours of his regular shift. Specifically, in the situation of coming in at 5:00 a.m. and working through to the end of the regular shift at 3:20 p.m. *the worker is entitled to four hours at time-and-one-half and six hours at straight time.* He should be paid for twelve hours.

"Even if it is granted that such an interpretation clearly flows from the wording of the contract, is it reasonable and equitable in the circumstances? In the judgment of this arbitrator it is. An employe comes in at the quite inconvenient hour of 5:00 a.m. However, he does not have to make a special trip to the plant because he continues to work on his regular shift. The interpretation proposed gives the employe an extra hour's pay over what he would have if he were paid only for overtime. He is compensated for the inconvenient hour. On the other hand, the company is not required to pay the employe for an extra trip to work that the employe does not make.

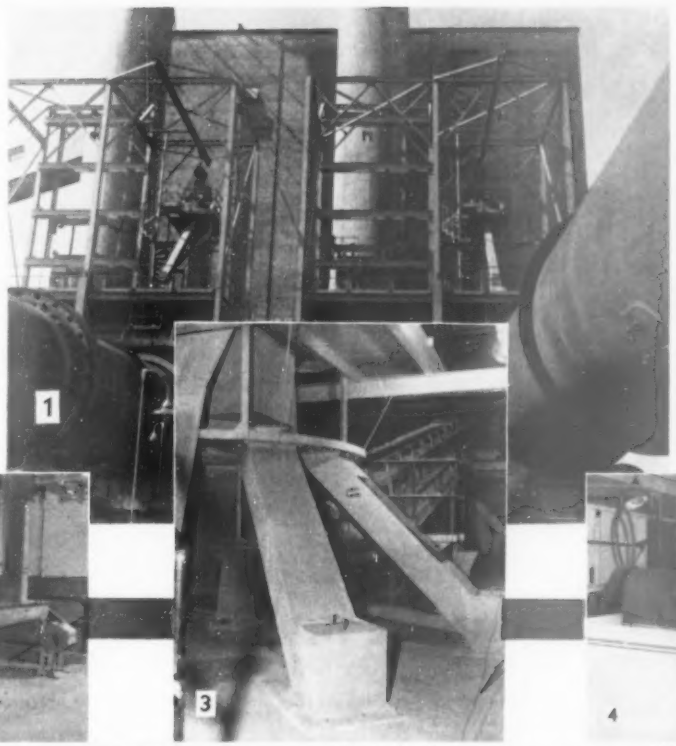
"Does this interpretation do violence to any understandings the parties might have had when they wrote Section 16? It would not seem so. Judging from the discussions at the hearing, the parties did not have the situation which gives rise to this arbitration in mind at all. Certainly the special agreement which was made with the board machine crews indi-

(Continued on page 152)

Webster

1 This twin installation of Webster Bucket Elevators provides 'round the clock service at the very heart of the plant's operations.

2 These dust recovery screw conveyors quickly handle material from the kilns, resist the wear and stresses of such an operation.



3 The handling of rough stone to various storage bins imposes abrasive action and operation problems that Webster equipment quickly solves.

4 Quick moving of coal is a continuous operation at Basic. The Webster Shuttle Belt Conveyor gives speedy, low cost service here.

At BASIC REFRACTORIES *Webster Conveying Equipment Provides Faster, Economical Service*

Keeping the production flow moving day and night is mighty important at Basic Refractories. Webster Conveying Equipment has withstood the extra stress and strain of stepped-up schedules and almost continuous operation at this important manufacturing center.

Placed at strategic points throughout the plant, Webster equipment has more than justified the confidence placed in it by Basic engineers, naturally interested in keeping down-time at a minimum and upkeep at a low level.

Results obtained at Basic Refractories prompt us to suggest that similar results can be enjoyed by you, regardless of the quarrying operation in which you are engaged. Feel free to write us . . . there is no obligation in having a Webster engineer study your needs.

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Send for Free Information

- We will gladly send literature covering all types of Webster Equipment. Write today!

Choose the hoist with 9 lives...

CHOOSE HERCULES—Whatever the type or capacity of the next dump truck hoist you buy, the name HERCULES is your strongest guarantee of top performance and long life. From coast to coast, Hercules Hydraulic Hoists are favorites because they have earned the reputation of having 9 *lives*. Owners are continually amazed at the ability of Hercules Hoists to withstand severe use and to outlast other makes without repair.

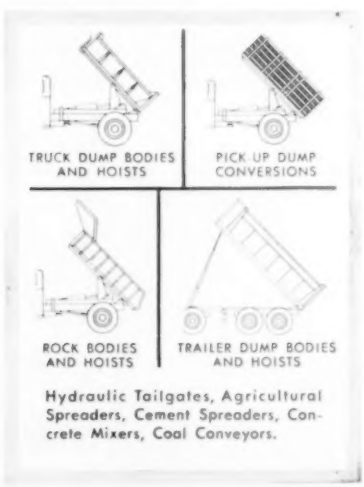
One of the famous Hercules Hoists is the Model 100 for 8 to 11 ft. dump bodies. Here are nine reasons why the Model 100 has nine lives, and why you should make it your next choice in this work range:

1. Takes more overloading.
2. No cramping nor strain on hinge bolts.
3. Lift arm design keeps body from tilting farther than intended.
4. No hoist stresses except direct lift transmitted to truck frame.
5. Uniform oil pressure.
6. Maintenance requirements are minimum.
7. Every part can "take it"—no Achilles' Heel.
8. Precision built of highest quality materials.
9. Rigidly inspected at every step of production.

BUY FROM THE LINE OF STRONGEST DESIGN

Hercules

HOISTS AND DUMP BODIES FOR EVERY NEED



Hydraulic Tailgates, Agricultural Spreaders, Cement Spreaders, Concrete Mixers, Coal Conveyors.

HERCULES STEEL PRODUCTS CORPORATION • GALION, OHIO

Grinding

(Continued from page 109)

ring. Therefore the mill may always be operated, throughout its entire length, at the most efficient rotative speed for its diameter. The lifting surfaces of these shell-liner plates may be the same as that of any conventional shell-liner plate. Rolled plate liners, such as the Lorain, may be used if preferred. A sketch of both types is shown in Exhibit E.

Experiments have been conducted with the Carman ball-classifying shell-liner plates installed in commercial cylindrical tube mills over a period of years. All of these tests were made in standard 8- x 22-ft. tube mills grinding portland cement clinker. In every test two identical parallel units were used, one of which was always equipped with the Carman ball-classifying shell-liner plates, and the second always equipped with conventional liners, both with and without partitions.

In the first test the two parallel test units were finishing a minus 20-mesh Krupp ball-mill product in open-circuit operation. Prior to the installation of the first set of the Carman liners in one tube mill, this same mill had been equipped with a single, double-diaphragm partition, and with conventional shell-liner plates. The parallel mill was an exact duplicate. Just prior to installing the Carman liner plates, this test mill was shut down under load and a careful check was made of the distribution of the ball sizes throughout the length of the tube mill. This test is shown as Curve *A*, Exhibit A. After making this test, the entire ball charge was dumped, the old liners and the partition removed, and the new Carman shell liners were installed. Upon completion of this work, the original ball charge was put back in this same mill, allowed to operate long enough to insure complete classification, and then again shut down under normal load to make a new ball size-distribution test. The results of this test are shown as Curve *B*, Exhibit A. From a comparison of the two curves it is clear that the Carman ball-classifying liner plates did an effective job of classifying the grinding balls in this tube mill. All migration of large balls to the discharge end was stopped. Even though the proportions of balls of various sizes were not ideal at the time, the classifying action was perfect.

These two parallel tube mills were kept in competitive operation for several years. Later the entire clinker-grinding department was modernized and enlarged. Two additional 8- x 22-ft. tube mills were purchased. These, with the older pair, were installed in two, parallel, two-stage, grinding units. In each unit one 8- x 22-ft. tube mill served as a primary mill, in open circuit, and one was used as a secondary mill operated in closed circuit with a 16-ft. air separator. To continue the experiment with the Carman ball-classifying shell-liner plates, one two-mill unit was completely equipped with these liners. The second unit was equipped with conventional shell-liner plates. The primary tube mill in the orthodox unit was equipped with a single partition, but none was placed in the secondary mill. Merrick scales were installed at the feed end of each primary tube mill, thus making it possible to obtain accurate capacity comparisons between the two units.

After operating for a considerable period of time, and producing approximately 1,000,000 bbl. of several types of cement, it was clear that the unit equipped with the ball-classifying shell-liner plates was outproducing the duplicate parallel unit with the conventional shell-liner plates. The types of cement produced in this finishing department ranged from 1300 to above 2700 specific surface. On each type the unit with the Carman liners outground the parallel unit—the improvement varying from 2.17 percent to more than 7.50 percent.

These continuous full-scale commercial tests made it possible to study the differences in these two parallel units. All of the many tests made to check the action of the classifying liners proved without question that the classifying action was practically perfect and that all reverse-ball migration had been eliminated. The perfection of the classifying action was proven in another way when it was found that it required fewer tons of grinding balls to bring the ball load in the classifying mills up to the same mill volume load level as in the tube mills equipped with the conventional shell-liner plates. This was undoubtedly due to there being more open void area in the mills with Carman liners than in the mixed size ball loads in the conventional tube mills.

Another advantage found with these liners was that it was very easy to make any desired change in the proportions of any size of ball in the mills equipped with them. Instead of having to dump an entire mill, or a complete compartment in a mill, and sort out the size not wanted, in the mills with the Carman liners it was only necessary to shovel out the size not wanted and replace with the new size wanted. In a few hours all of the balls were in their proper places throughout the mill.

These experimental tests with the ball-classifying shell-liner plates have proven that effective ball classification is obtained, and continuously maintained; that the usual, undesirable, reverse-ball migration is completely eliminated; that the investment and maintenance cost of partitions can be eliminated, and every foot of the mill be used for production work; that adjustments in the sizes of balls in the mill equipped with these liner plates are made simple and can be accomplished with savings in time and labor.

Labor Relations Trends

(Continued from page 148)

cated that the parties either did not have in mind the bearing of Section 16 upon the situation in the board machine department, or were in doubt as to its applicability. The same inference holds in regard to the discussions that the parties had about the work of the pump man on Sundays.

"Therefore, the interpretation offered by the arbitrator is as follows: Whenever an employe is required to come to work at a time within four hours of the beginning of his shift, and continues to work into his regular shift without leaving the plant, he is entitled to time-and-one-half for the hours worked before the beginning of his shift, and also to time-and-one-half for hours or fractions thereof worked on his regular shift, to the extent needed to guarantee him four hours at time-and-one-half.

"The other grievance concerns the pump man who comes in Sunday to check the pumps. The company maintains that the checking of the pumps on Sunday is part of the regularly scheduled work of the pump man, and that this work is not properly classified as 'report-in' or 'call-in' work. It points out that the hours of maintenance workers are usually somewhat irregular and that such workers often receive a higher rate than production workers because of the irregularity of their schedules.

"The union on its part argues that the pump man's situation is covered by Section 16, and that he should receive pay on such basis. The union further argued that the pump man had received such pay up until the time 'call-in' pay was raised from three to four hours. The company maintains that it is not possible to show that the pump man was paid on a 'call-in' basis under the older contracts when 'call-in' was either two hours or three hours.

"A decision for the union on this grievance would probably stretch the meaning of Section 16 beyond anything that was originally intended when it was first written, yet the arbitrator feels that the company was unable to establish the existance of a clear understanding—implicit or explicit—that the pump man was by long practice and consent an exception to Section 16. In fact, representatives of the company admitted that it probably could not be shown either that the pump man had been paid 'call-in' pay under previous contracts, or had not been so paid.

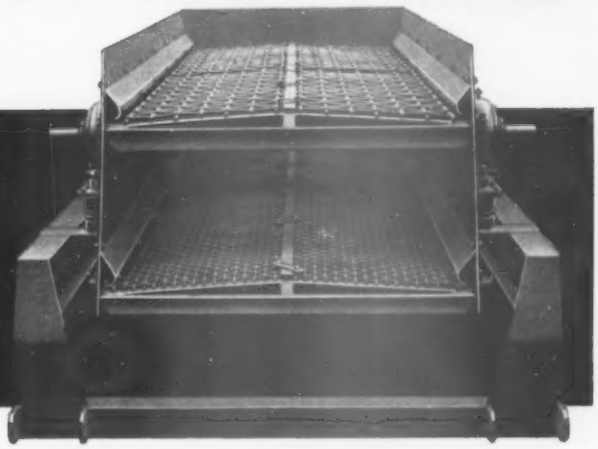
"Lacking a showing that in the negotiations the parties had a meaning in mind for Section 16 that would except the pump man, the arbitrator is under the necessity of following the plain wording of the section. The pump man is required 'to report-in' on Sundays. Under Section 16 he

(Continued on page 154)

ANNOUNCING

Diamond's

5 ft. wide VIBRATING screens



10'—12'—14' LENGTHS

1—2—2½ and 3 DECKS

for ANY INSTALLATION

SPECIFICATIONS

- Timken double row bearing equipped
- Rubber mounted main bearing cages
- Adjustable spring balance cups
- Screen clamp bars over center supports
- 5/16" side plates
- 5/16" throw on shaft

SHAFT DIMENSIONS

4½" at main bearing
5¼" at pitman bearing
5¾" between pitman bearings
3 7/16" shaft at flywheel

Write for full engineering details today. For other vibrating screens from 2 x 5 to 4 x 14, ask for "DIAMOND SCREENS AND WASHERS" bulletin.

FEATURING DIAMOND'S NEW SIDE PLATE CONSTRUCTION!

FIELD TESTED for the past two years, Diamond's new series of 5' wide vibrating screens give you high production, low operating and maintenance costs, and freedom from work stoppage. Diamond's new method of reinforcing the side plates at the shaft eliminates vibration. Heavy steel plates between the bearings double the side plate strength.

Positive vibrating action plus plenty of headroom between decks give faster separation of material over entire screening area. Aggregate moves quickly from top to bottom of screen, using gravity through Diamond's inclined screen construction, to maintain a high rate of production without clogging.

EASILY EQUIPPED FOR WASHING AGGREGATE

Vibrators may be easily equipped with spray bars for washing sand and gravel during the screening operation. Screens can be driven with "V" or flat belt drive.

Everything. . . for the aggregate producer

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AND THE MAHR MANUFACTURING CO. DIV.
1710 N. 2ND STREET, MINNEAPOLIS 11, MINNESOTA

is entitled to at least four hours at time-and-one-half his regular rate."

Award

General grievance: "Employes who are required to come to work before the beginning of their regular shift, and who continue to work into their regular shift, are entitled to pay at time-and-one-half for the hours worked before the beginning of their shift, and in addition are entitled to pay at time-and-one-half for as many hours of the regular shift as are necessary to give the employe pay for four hours at time-and-one-half. Specifically an employe who comes to work at 5:00 a.m. and works through his regular shift beginning at 7:00 a.m., is entitled to two hours at time-and-one-half for the hours between 5:00 a.m. and 7:00 a.m., and is entitled to be paid at the rate of time-and-one-half for two hours of his regular time.

Pump man grievance: The pump man who reports on Sunday to check pumps is entitled to 'report-in' pay of at least four hours at time-and-one-half his regular rate."

Short-Cut Truck Road

(Continued from page 124)

survey was completed and the route found practicable.

Now came the great problem of how to secure the funds to build such a highway. After a great deal of hard work this problem was overcome by Supervisor Legg who secured the allocation of sufficient gasoline tax funds to complete the job—in excess of $600,000.

At one time, it all seemed a dream impossible of accomplishment, but at 11 a.m. on May 11th, this great truck highway was opened with impressive ribbon-cutting ceremonies and the great trucks and trailers rolled through. All of the civic organizations of the San Gabriel Valley were represented at these ceremonies, including women's clubs, school officials, parents-teachers associations, service clubs, the officials of the various cities in the area, improvement associations, the Greater Los Angeles Chapter of the National Safety Council, the California Highway Patrol, officials of the County of Los Angeles and the members of the Southern California Rock Products Association. Following the ceremonies the association was the host for a buffet luncheon which was served to over 400 guests.

Pennsylvania Meeting

(Continued from page 126)

of his outstanding experiences as a county agent in increasing the productivity and value of a farm through the application of agricultural limestone. The meeting was concluded with a speech by Clyde A. Zehner, state chairman, Production & Marketing Administration, U.S. Department of Agriculture, who discussed the reorganization of the conservation branch.

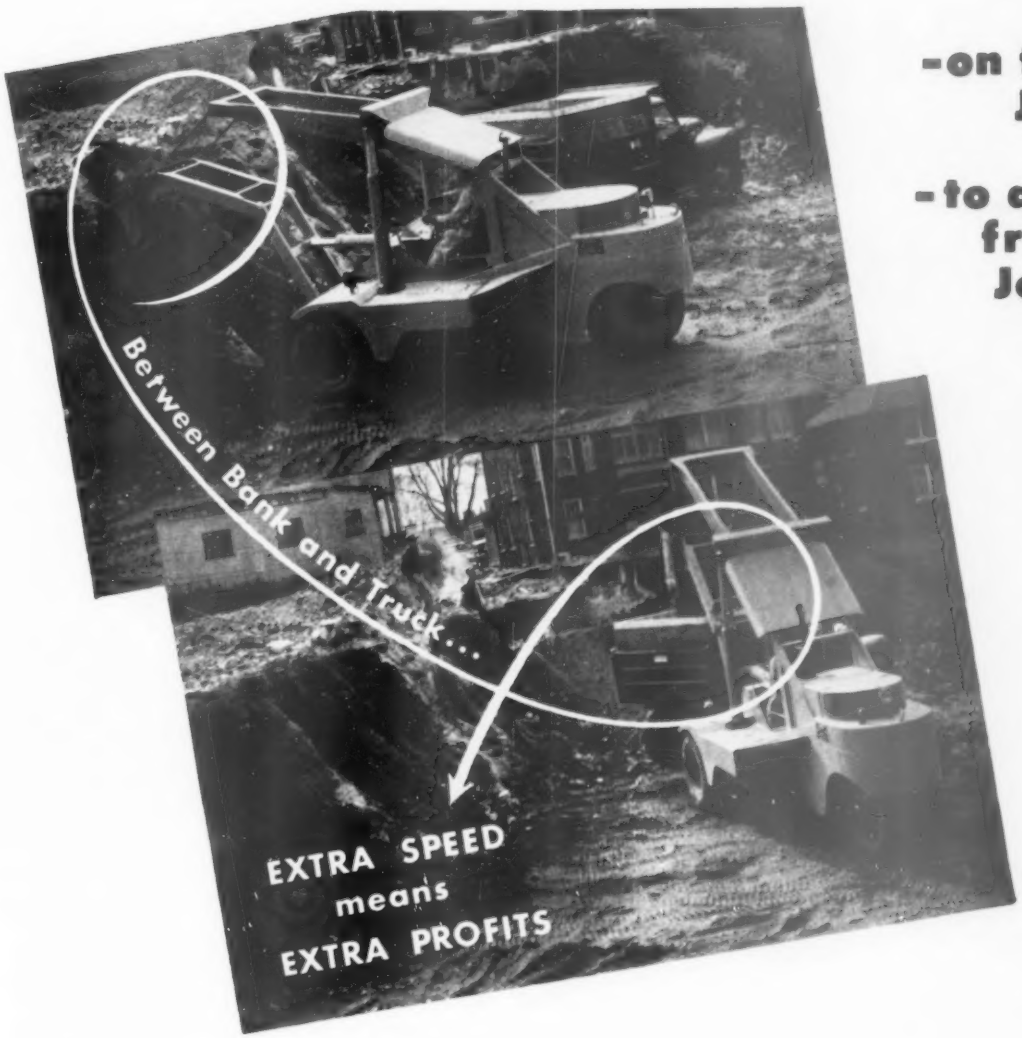
Conveyor Belt Road?

A RUBBER CONVEYOR BELT ROAD to transport limestone and iron ore from harbor to industrial processors in the Cuyahoga Valley of Cleveland, Ohio, has been proposed by engineers of The B. F. Goodrich Co., Akron, Ohio. The problem had been studied for over a year and the engineers reported that the 4½-mile belt road could be built in a year at an estimated cost of $6,000,000 for the conveyor and drive equipment. Dock and loading facilities, as well as rights of way, would be additional. Spur lines would carry materials from the main belt road to the stockpiles of individual industrial users. Company engineers predict the new belt road system will open a new era of industrial expansion.

Cuban Cement Plant

CEMENTO GIBARA is a new Cuban firm organized for the purpose of building a cement plant at Gibara in eastern Cuba. The plant, which will cost approximately $4,500,000, will have a capacity of 2400 bbl. of cement daily. Cuba has only one other cement plant which has a 1200-bbl. daily capacity. Nestor Galvez is head of the new firm. The construction contract has been awarded to Fish Engineering Corp., Houston, Texas. The plant is scheduled for completion in about a year.

This Dempster-Diggster Hydraulic Shovel gives you *TRUCK-SPEED MOBILITY*



-on the Job

-to and from Jobs

These fast moving advantages are obvious and mean the Dempster-Diggster will make more money for you.

In the first place, no hauling equipment is needed . . . no loading and unloading time or man-hours are lost in getting the Dempster-Diggster to and from jobs. In the second place, with truck-speed mobility on the job, this power-packed 100% Hydraulic Shovel gets the job done faster! Here's a shovel that won't skim the bank or bottom—but gets a full bucket with every stroke. It's the only small shovel that offers you all the important features of big shovels . . . Simultaneous and Independent Crowd and Hoist . . . Hydraulic Crowding . . . Hydraulic Hoisting . . . Variable Crowd Action at any Dipper Position in addition to Changeable Buckets for digging or loading.

Write for complete facts on this revolutionary, power-packed hydraulic shovel. A product of Dempster Brothers, Inc.

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FINANCIAL

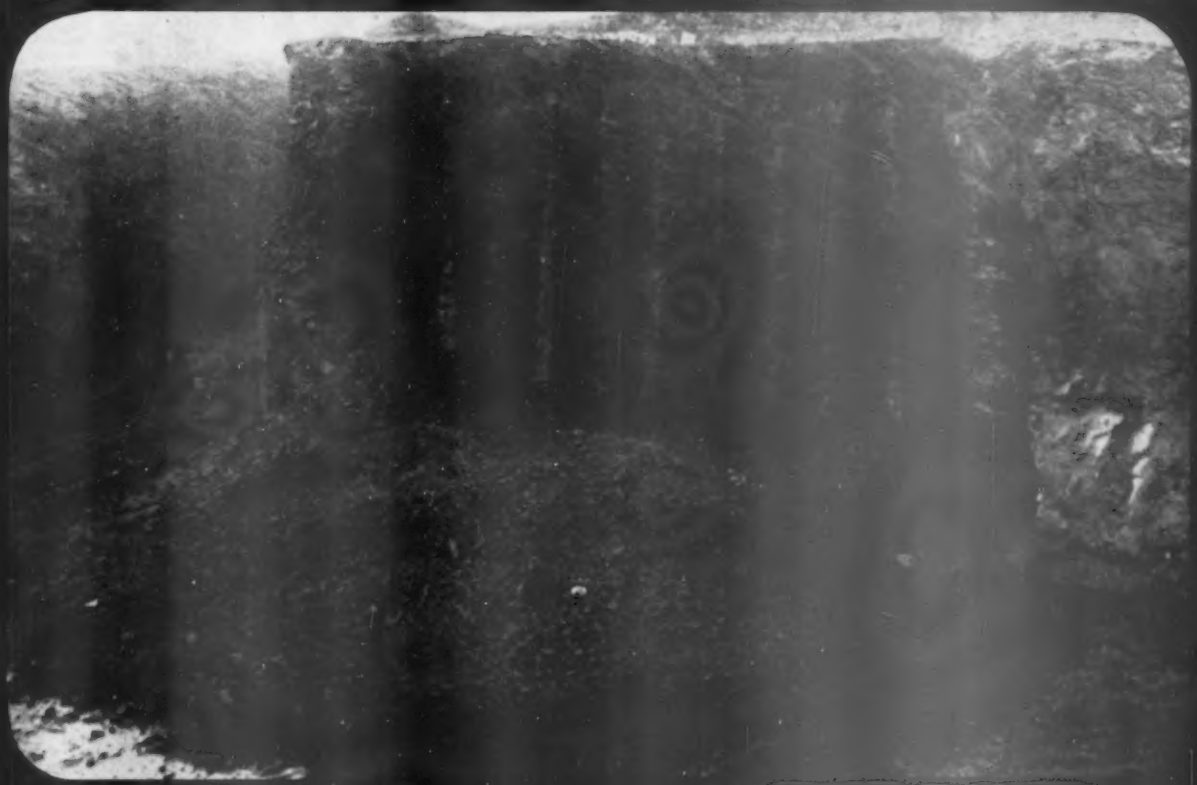
RECENT DIVIDENDS

Alpha Portland Cement Co.	$0.50	March 10
Arundel Corp.	0.30	Apr. 1
Basic Refractories, Inc.—Q.	0.25	March 31
Basic Refractories, Inc.—pf.—Q.	1.43¾	Apr. 1
Bessemer Limestone & Cement Co.	0.50	March 11
Bessemer Limestone & Cement Co.—pf.—Q.	0.50	Apr. 1
Blue Diamond Corp.—Q.	0.15	March 16
California Portland Cement Co.	0.40	Apr. 25
California Portland Cement Co.—Sp.	0.60	Apr. 25
Canadian Cement Co., Ltd.—pf.	0.32½	March 20
Canadian Crushed & Cut Stone—6% pf.	1.50	Apr. 1
Colonial Sand & Stone Co., Inc.—Q.	0.05	May 6
Consolidated Rock Products Co.	0.05	March 16
Consumers Co.	0.75	March 15
Dragon Cement Co., Inc.	0.50	March 20
Flintkote Co.—Q.	0.50	March 19
Flintkote Co.—pf.—Q.	1.00	March 16
General Portland Cement Co.	0.50	March 31
Giant Portland Cement Co.—Stk.	2%	Apr. 1
Gypsum Lime & Alabastine, Canada, Ltd.	0.50	June 1
Hercules Cement Corp.—Q.	0.25	Apr. 1
Ideal Cement Co.	0.50	March 31
Keystone Portland Cement Co.—Q.	0.75	March 13
Lehigh Portland Cement Co.—Q.	0.30	March 2
Lone Star Cement Corp.—Q.	0.35	March 31
Longhorn Portland Cement Co.	0.40	March 13
Marquette Cement Manufacturing Co.	0.35	March 30
Medusa Portland Cement Co.—Q.	0.60	Apr. 1
National Gypsum Co.—Q.	0.35	March 31
National Gypsum Co. $4.50 pf.—Q.	1.12½	March 2
North American Cement Corp. A & B com. Q.	0.15	March 12
Northwestern Portland Cement Co. 1st. pf.	1.50	March 20
Pacific Coast Aggregates, Inc.	0.10	March 24
Pacific Coast Aggregates, Inc.—pf.—Q.	1.12½	Apr. 15
Peerless Cement Corp.	0.25	March 13
Penn-Dixie Cement Corp.	0.40	March 13
Pennsylvania Glass Sand Corp.—Q.	0.30	Apr. 1
Pennsylvania Glass Sand Corp. 5% pf.—Q.	1.25	Apr. 1
Pennsylvania Glass Sand Corp.—Stk.	10%	March 6
Riverside Cement Co. Cl. A Ac.	0.50	March 16
Santa Cruz Portland Cement Co.	1.00	March 20
Standard Silica Corp.—Q.	0.12½	Feb. 14
Superior Portland Cement, Inc.	0.30	March 10
U.S. Gypsum Co.—Q.	1.00	Apr. 1
U.S. Gypsum Co. 7% pf.—Q.	1.75	Apr. 1
Warner Co.—Q.	0.40	Apr. 15
Whitehall Cement Manufacturing Co.—Q.	1.00	March 31

DRAVO CORP., Pittsburgh, Penn., has reported a total of $65,292,826 for products, services and completed construction contracts for 1952, as compared to $63,214,182 for 1951, years ending December 31. A net profit of $3,106,314, or $6.07 per common share on 497,803 shares and $75.40 per pfd. share on 41,198 shares, was reported for 1952, as compared to $3,720,560, or $7.30 per common share on 498,517 shares and $90.31 per pfd. share on 41,198 pfd. shares for the previous year.

INTERNATIONAL MINERALS & CHEMICAL CORP., Chicago, Ill., reports, for the six months ended December 31, 1952 net sales of $35,729,199, compared with $31,846,547 for 1951. Net profit for the six-month period of 1952 amounted to $1,720,856, or $0.66 per share on 2,314,589 shares. This

Here's the secret of alternate ROCKMASTER® teamed with alternate velocity loading



Alternate Velocity Loading is a newly introduced ROCKMASTER development which has produced astounding improvements in breakage and holds great promise for better blasting in mining, quarrying and construction work.

Every other hole is loaded with low velocity explosives. The balance are loaded with high velocity explosives. The faster ROCKMASTER millisecond delay caps fire the low velocity holes to stress the rock and the next delay interval releases the sharp second punch of the high velocity explosive.

The results of alternate velocity action can be seen in the photo above. The number one holes (which appear larger and lighter colored) were loaded with low velocity Apex and fired with No. 1 ROCKMASTER caps. The number two holes (which appear smaller and darker) were loaded with high velocity Apex and fired with No. 2 ROCKMASTERS.

All holes were initiated from the bottom to prolong confinement of the blast—giving maximum results of the alternate velocity loading.

At present Alternate Velocity Loading is being used only in quarry blasting, but it holds possibilities in many other fields. Talk with your Atlas representative about it. And send for your copy of the new Atlas periodical "Better Blasting" which details *the inside story* of Alternate Velocity Loading.

Absolutely no secondary breaking was necessary on this Alternate Velocity Shot. No. 1 holes show that explosive has worked longer on the burden than the high velocity explosive in the No. 2 holes.

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

Offices in principal cities

compares to $1,703,492, or $0.70 per share on 2,160,161 shares for the same period of the previous year.

ASBESTOS CORP., Montreal, Que., has reported the folowing earnings for the years ending December 31:

	1952	1951
Net earnings	$8,012,943	$7,436,860
Less: Depr.	1,200,000	1,200,000
Expl. exp.	65,245	145,766
Taxes	2,500,000	2,190,000
Net profit	4,247,698	3,901,094
Less: Div.	2,250,000	1,830,000
Surplus for year	1,997,698	2,071,094
Earn. per sh.	$2.36	$2.17

GENERAL PORTLAND CEMENT CO., Chicago, Ill., lists a net income of $4,894,200, or $4.71 per share on 1,039,971 shares for the year ending December 31, 1952, as against $4,532,400 net income, or $4.36 per share on the same amount of shares for the previous year. Net sales were increased to $29,435,000 for 1952 from $27,121,000 for 1951.

UNITED STATES GYPSUM CO., Chicago, Ill., submits the following report of earnings for the 12 month periods ended December 31:

	1952	1951
Earn. per com. sh.	$11.55	$12.05
Net sales	$184,900,386	$188,125,170
Total income	187,258,694	189,868,830
Costs and exp.	140,901,478	137,155,569
Fed & Can. income taxes	24,193,000	27,238,000
Excess profits taxes	3,133,000	5,655,000
Net income	19,031,216	19,820,261
Preferred div.	547,554	547,554
Common div.	11,998,414	11,198,264
Surplus	6,485,248	8,074,443

GIANT PORTLAND CEMENT CO., Philadelphia, Penn., gives a net income account of $977,650, or $0.79 per share on 1,245,245 shares for 1952, year ending December 31, as compared to $547,699 net income or $0.47 per share on 1,154,114 shares for 1951. Net sales for 1952 amounted to $6,765,091, as against $5,154,896 for the previous year.

FLINTKOTE CO., East Rutherford, N. J., lists the following income for years ended December 31:

	1952	1951
Earn. per com. sh.	$3.61	$4.11
Net sales	$84,039,381	$84,265,587
Profit before income taxes	9,427,564	10,710,476
Fed. & Can. income taxes	4,531,191	5,194,105
Net income	4,896,373	5,516,371
No. com. sh.	1,260,435	1,260,435

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., has reported a net income of $547,630, or $0.67 per share on 736,955 shares for the year ending December 31, 1952, as compared to a net income of $803,174, or $1.01 per share on 736,962 shares for the previous year. Net sales reported for 1952 were $15,778,511, as against $17,130,156 for 1951.

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, has reported a net profit of $934,504, or $1.87 per share on 499,160 shares for 1952, year ended December 31. This compares with a 1951 net profit of $990,582, or $1.99 per share on the same amount of shares as 1952.

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., reports a net income of $1,704,088, or $5.79 per share on

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COMPARE CLUTCHES!

Link-Belt Speeder's hydraulic clutch needs fewer adjustments eliminates jerk, jump or lag

THE Speed-o-Matic power-driven hydraulic controls and clutch eliminate mechanical clutch linkage. This results in unequalled ease and speed of operation . . . smooth, instantly responsive action. You get longer lining life, freedom from frequent attention and far less chance for clutch failure.

For details on the Speed-o-Matic clutch . . . information on the Link-Belt Speeder line of crawler, wheel or truck mounted shovel-cranes, write:

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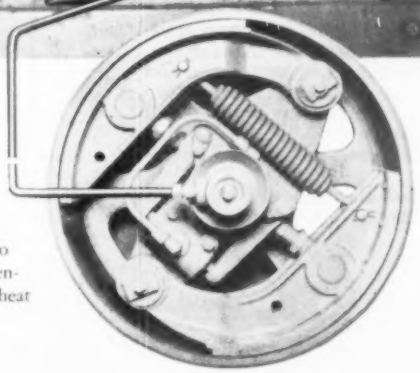
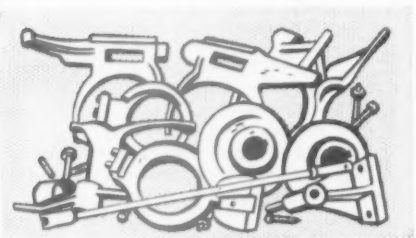
Cedar Rapids, Iowa



Speed-o-Matic Clutch shoes are actuated by perfectly controlled variable hydraulic pressure transmitted directly *into* the clutch. There are no mechanical linkages, no boosters. Clutch is self-compensating, automatically adjusts for heat and normal lining wear.



Eliminates up to 150 parts — there are no worn bushings, pins, links or clutch toggles to put you "down."

LINK-BELT SPEEDER CORPORATION

BUILDERS OF A COMPLETE LINE OF CRAWLER, TRUCK AND WHEEL-MOUNTED SHOVEL-CRANES

FACTORY-TRAINED DISTRIBUTOR SALES AND SERVICE SPECIALISTS ...EVERYWHERE

294,131 shares for 1952, year ending December 31, as against net income of $1,433,904, or $4.87 per share on 294,131 shares for 1951. Net sales in 1952 were $12,989,918, compared with $12,579,421 for the previous year.

LONE STAR CEMENT CORP., New York, N.Y., gives the following account of income for years ending December 31:

	1952	1951
Earned per share	$3.12	$3.14
Sales	$80,944,277	$71,378,738
Profit before inc. taxes	19,556,760	21,276,603
Fed. income taxes	7,800,000	8,750,000
Excess profits tax	1,000,000	1,500,000
Other income taxes	1,877,146	2,094,596
Net profit	8,879,614	8,932,007
No. capital shares	2,845,791	2,845,791

HERCULES CEMENT CORP., Philadelphia, Penn., has listed a net profit of $571,437, or $3.66 per share on 155,973 shares for the year ending December 31, 1952. This compares with a net profit of $549,233, or $3.54 per share on 155,223 shares in 1951. Net sales for 1952 amounted to $5,117,988, as against $5,475,135 for the previous year.

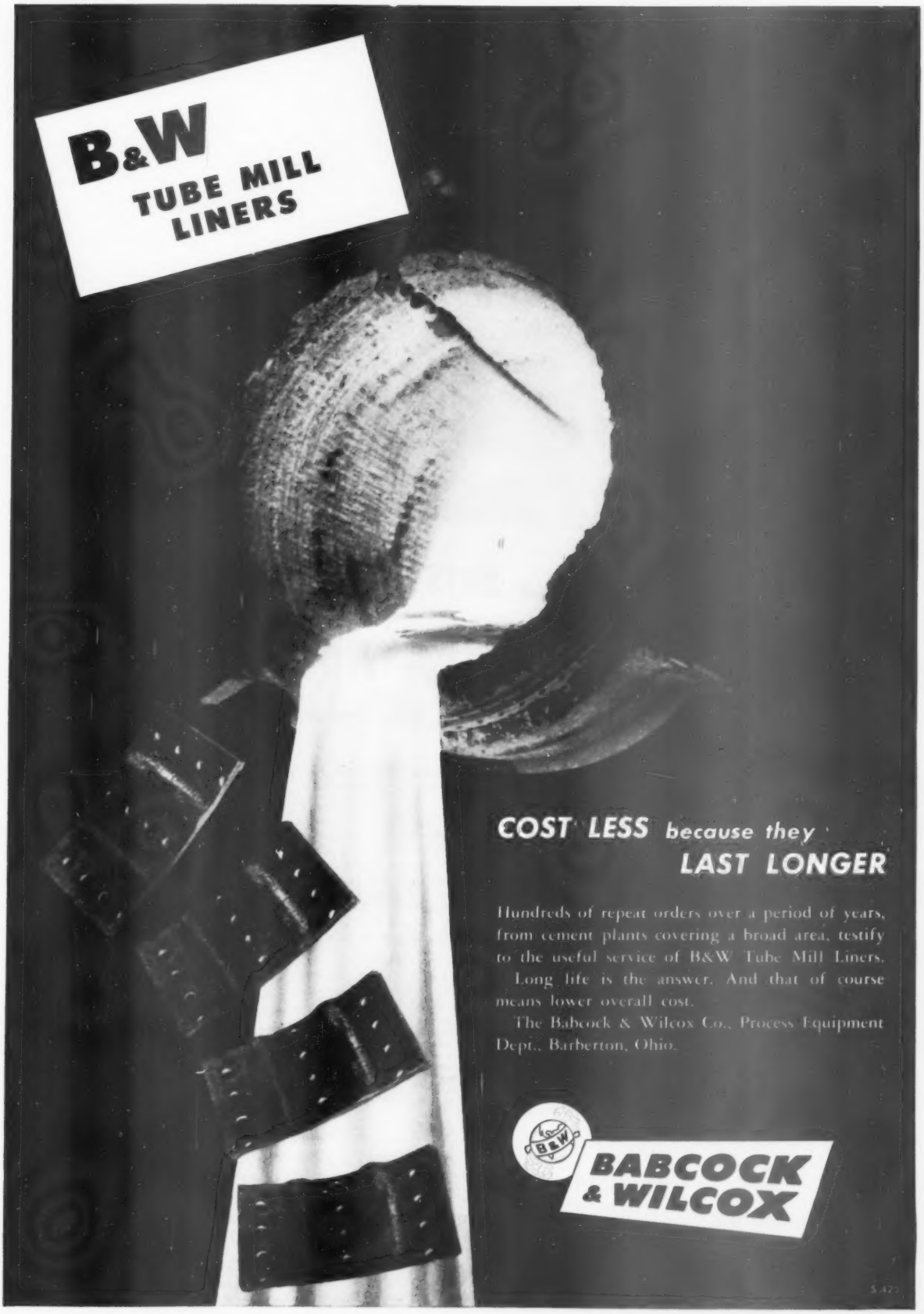
NATIONAL GYPSUM CO., Buffalo, N.Y., reports the following account of earnings for periods ending December 31:

	1952	1951
Net sales	$99,130,386	$95,489,963
Cost of sales	68,382,806	67,877,491
Selling, etc., exp.	11,920,857	8,928,178
Net earn.	18,826,723	18,684,294
Prof., marine oper.	415,195	902,727
Other income	1,280,743	1,113,075
Total income	20,522,661	20,700,096
Debt int., etc.	742,107	531,956
Prop. disp. & ret.	78,781	79,525
Other deductions	140,725	79,187
Fed. inc. taxes	9,670,000	9,290,000
Excess profits tax	2,090,000	2,290,000
Other inc. tax.	575,122	779,447
Pr. yr. inc. tax	cr. 23,554	253,998
Net income	7,249,480	7,395,983
Earn. surplus, 1-1	27,295,116	24,185,455
$4.50 pfd. divs.	450,008	450,008
Com. divs. (cash)	3,241,416	3,029,362
Com. divs. (stock)	985,467	806,952
Earn. surp., 12-31	29,867,705	27,295,116
Times pfd. divs.	16.11	16.44
Earn., pfd. share	$72.49	$73.96
No. of pfd. shares	100,000	100,000
Earn., com. sh.	$2.84	$3.12
No of com. sh.	2,394,375	2,224,607

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Penn., for the 12-month period ending December 31, 1952, lists net sales of $5,945,851, compared with $6,131,959 for the previous year. Net profit reported for 1952 amounted to $748,406, or $5.49 per share on 136,434 shares, as against $733,379 net profit, or $5.30 per share on 138,256 shares for 1951.

AMERICAN POTASH & CHEMICAL CORP., Los Angeles, Calif., reports net sales for 1952 as $18,049,179, compared to the 1951 figure of $17,749,144. Net income for 1952 amounted to $1,670,555, or $18.16 per pfd. share on 92,000 pfd. shares and $3.28 per cl. A and B shares on 431,227 cl. A and B shares. This compares with a net income for 1951 of $1,970,622, or $30.98 per pfd. share on 63,600 pfd. shares and $3.24 per cl. A and B shares on 528,390 shares.

ARUNDEL CORP., Baltimore, Md., reports net sales of $17,013,853 for 1952, compared to net sales of $14,970,005 for the year prior. Net income for 1952 amounted to $1,186,264, or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Hundreds of repeat orders over a period of years, from cement plants covering a broad area, testify to the useful service of B&W Tube Mill Liners.
Long life is the answer. And that of course means lower overall cost.
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$2.71 per share on 438,376 shares, against the 1951 net income of $5,266,-918, or $2.64 per share.

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., has listed the following account of income, years ending December 31:

	1952	1951
Net sales	$53,616,855	$50,776,570
Cost of sales	32,629,106	29,624,786
Selling, etc., exp.	4,448,073	4,022,672
Deprec. depl., etc.	3,597,941	2,970,173
Net earn.	12,941,735	14,148,939
Other income, net	236,665	283,599
Total income	13,178,400	14,432,538
Fed. income tax	6,350,000	7,102,000
Excess prof. tax	1,000,000	1,821,000
Net income	5,828,400	5,509,538
Earn. surplus, 1-1	8,126,639	18,822,254
Com. divs.	2,281,745	2,281,732
Tfr. to com. stk.		13,923,421
Earn. surp., 12-31	11,673,294	8,126,639
Total taxes	8,459,996	9,976,845
Earn. per sh.	$3.07	$2.90
No. of shares	1,901,560	1,901,560

DRAGON CEMENT CO., INC., New York, N.Y., has reported a net income of $971,975, for the 12-month period ending March 31, 1953, or $5.17 per share on 170,123 shares, as against a net income of $821,289, or $4.82 per share, for the same period ending March 31, 1952. Net sales for the years amounted to $9,-325,771 for 1953, and $9,319,830 for 1952.

ALPHA PORTLAND CEMENT CO., Easton, Penn., gives the following account of income for years ending December 31:

	1952	1951
Net sales	$25,341,796	$24,324,601
Cost of sales	15,902,495	14,595,790
Selling, etc. exp.	2,372,388	2,178,746
Deprec. & deplet.	899,029	794,301
Oper. profit	6,167,884	6,756,764
Other income, net	172,078	119,684
Total income	6,339,962	6,876,448
Fed. inc. tax	3,050,000	3,480,000
Excess prof. tax	510,000	820,000
Net income	2,779,962	2,576,448
Surplus, Jan. 1	8,956,193	8,140,613
Com. divs.	1,760,868	1,760,868
Pr. yrs. tax adj.	cr. 400,000	
Tfr. to cap. surp.	3,100,223	
Earn. surp., 12-31	7,275,064	8,956,193
No. of shares	586,956	586,956
Earn. per sh.	$4.74	$4.39

NEW ENGLAND LIME CO., Adams, Mass., reports a net income of $165,-236, or $2.36 per share on 69,622 shares for 1952, year ending December 31, as against a net income of $193,785, or $2.76 per share for the previous year. Net sales listed for 1952 were $1,676,909, compared to $1,799,838 for 1951.

WARNER CO., Philadelphia, Penn., for 1952, lists a net income of $2,267,-893 (after deducting net loss on abandonment of magnesia plant), or $4.78 per share on 474,327 shares. This compares to the 1951 net income of $2,592,001, or $5.46 per share on 474,329 shares.

FOOTE MINERAL CO., Philadelphia, Penn., lists a net income of $330,275, or $1.23 per share for 1952, compared to $430,984, or $1.63 per share for 1951. Net sales for 1952 amounted to $7,790,223, against $8,076,562 for the previous year.

COLONIAL SAND & STONE CO., INC., New York, N.Y., for the 12 months ended December 31, 1952, lists a net profit of $742,417, or $0.96 per share, compared with the 1951 net profit of $402,693, or $0.52 per share.

Typical shot fired with "Nitramon" and "Primacord" MS connectors creates minimum vibration.

DU PONT "NITRAMON"

BRINGS DOWN WELL-BROKEN ROCK IN SILICA QUARRY

Face of Pioneer Silica Products Co. quarry before "Nitramon" shot.

Result shows good spread of well-broken rock. Makes shovel work easy.

- Maximum safety and good fragmentation are prime reasons why the Pioneer Silica Products Company, Pacific, Missouri, regularly uses Du Pont Nitramon® blasting agent in their quarry blasting operations.
- The Pioneer property is a high-grade silica deposit with banks approximating 65 feet in height. Average shots consist of from 6000 to 7000 pounds of "Nitramon" detonated with "Primacord" MS connectors, which produce split-second delay intervals between holes . . . greatly reducing both vibration and secondary blasting.

"Nitramon" is ideal in operations of this kind. It cannot be detonated by commercial blasting caps, open flame, friction or sudden shock. However, a "Nitramon" Primer (itself relatively insensitive) can always be relied upon to fire every charge.

Ask your Du Pont Explosives representative for complete information about this safest blasting agent known. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

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GM DIESEL
CASE HISTORY No. 528-84

USER: B.L. Anderson, Cedar Rapids, Iowa.

INSTALLATION: 21 GM Diesels (3, 4, and 6-71's and "Twin" 6-71's) powering shovels, Koehring Dumptors and three portable rock crushers. Firm produces 4,000 to 5,000 tons of road stone per day.

PERFORMANCE: Supt. L.V. Porter reports GM Diesels have reduced fuel and maintenance costs considerably. Overhauls cost less and are needed less frequently. Crushers can run 7" material without stalling engines. Lighter weight of engines has made equipment easier to move.

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When this company replaced the gasoline engine in a shovel with a General Motors Diesel in 1945, fuel costs dropped 50%. That was B. L. Anderson's first GM Diesel. Now they own 21 units, because they found these engines reduce operating expenses.

The GM Diesel boosts production in all kinds of heavy-duty jobs because smooth 2-cycle operation makes it accelerate faster under load changes. It starts quickly in any weather and operates on a miserly quantity of low-cost fuel. It delivers dependable, economical power for thousands of hours without requiring major repairs.

And when service is needed, you'll find the cost surprisingly low. Compare parts costs with other Diesels, for example, and you'll quickly see what we mean. That's one of the many good reasons why contractors in every field are switching to GM Diesel power.

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INFORMATION

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TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

1 AIR VIBRATORS — Cleveland Vibrator Co. has released Catalog 106 containing illustrations, applications and listings of its line of air vibration equipment. Bins; hoppers; concrete block machines; chutes, handling mixed concrete, cement, sand, gravel, etc. are some of the applications listed. Also included is an engineering data sheet to indicate details of the user's particular problem.

2 ARC-WELDING — Westinghouse Electric Corp. describes and illustrates arc-welding accessories in a 12-pg. booklet, B-5451. Specification data and application characteristics are discussed.

3 AUTOMATIC INSTRUMENTS — The Bristol Co. has released Bulletin W1805 giving a complete listing of its automatic controlling, recording, and telemetering instruments.

4 BLOCK MACHINE—Bergen Machine & Tool Co., Inc. has issued a brochure describing and illustrating the Tri-Matic block machine. Drawings and explanations of machine parts are listed.

5 BUCKET ELEVATORS—Jeffrey Manufacturing Co. has issued Catalog 850 describing its line of bucket elevators including centrifugal and positive discharge, continuous bucket and super-capacity. A table lists types of elevators best suited for handling various materials.

6 BULLDOZERS—Caterpillar Tractor Co. has published a 36-page catalog, Form 30461, describing and illustrating various models of bulldozers, together with cutaway views and specifications. Bulldozer attachments such as brush, root and rock rakes, treedozer, and stumper are also shown and discussed.

7 BUNKER SEALS — Stephens-Adamson Manufacturing Co. has released Bulletin 952, describing and illustrating various models of zipper bunker seals. Typical applications are given along with drawings and specifications.

8 CHAINS—Chain Belt Co., Baldwin-Duckworth Div., has prepared a 54-pg. bulletin, No. 52-1, describing and illustrating roller chains and sprockets. Dimensions, strength and weight tables are listed along with installation, maintenance and selection data. Typical application photographs are also included.

9 CONCRETE MIXER—Muller Machinery Co., Inc. gives detailed specifications of its 6-S tilting concrete mixer in Bulletin A-24.

10 CONTROL VALVES—Hauck Manufacturing Co. has issued Catalog No. 805A describing use of its single control valve for manual or automatic operation of air and gas burners. Tables are given on mixer capacity for gases and air pressure ratings.

11 CONTROLLERS—The Bristol Co. has announced distribution of a 32-pg. bulletin, No. A120, describing instruments for automatic control of pressure, temperature, liquid level, flow, humidity, etc. The illustrated bulletin gives data on on-off, proportional, reset, derivative, and autoset types of controllers.

12 CONVEYING SYSTEMS — Holly Pneumatic Systems, Inc., has published an illustrated bulletin on its pneumatic conveying systems and transfer trucks. Photographs, drawings and descriptions are given of installations in industrial plants.

13 CONVEYOR BELT REPAIR — Magic Chemical Co. has begun distribution of a folder giving information on the use of Magic-Vulc plastic rubber for repairing conveyor belts and for protecting industrial equipment against corrosion and abrasion. Typical application data and photographs are given.

14 CONVEYORS—Stephens-Adamson Manufacturing Co. points out the uses of its various conveyors in Bulletin A-1758, Vol. 203. Typical applications, including use of conveyor-mounted centrifugal throwers and enclosed conveying equipment, are illustrated. Screw conveyors, roller conveyors and feed belts are some of the types described.

15 CRANES—Power Crane and Shovel Association has compiled Technical Bulletin No. 4 describing the functions of power cranes, shovels, draglines, and their attachments. The 60-pg. bulletin points out the applications and effective use of available front-end attachments used with the power shovels. Prepared especially as text material for professional engineers, students, contractors, operators and others dealing with excavating and materials handling operations, it is available from the association at a cost of $1.00 per copy. Complimentary copies are furnished to engineering schools and colleges.

16 CRUSHERS — Smith Engineering Works has issued Bulletin 282, illustrating and describing the Telsmith double roll crushers. Specification tables are given along with construction, adjustment, capacity and application data.

17 DIESEL ELECTRIC SETS—Caterpillar Tractor Co. describes five diesel electric sets in Booklet 30507. Cutaway views show the built-in features, while descriptions of the fuel, lubrication and cooling systems are also given.

18 DIESELS—Harnischfeger Corp., P. & H. Diesel Div., has offered an illustrated, 28-pg. booklet entitled, "What You Should Know About Diesel Engines." It records the diesel's invention and development; compares it with other engines; lists the various types; explains its operation; and reports the latest advancements made in engine design.

19 DUMP BODIES—Marion Metal Products Co. has introduced a booklet, the first of a series of bi-monthly company publications, entitled "Dump Body Business." Its line of dump bodies and typical job applications are described and illustrated.

20 ELECTRIC POWER SYSTEMS—General Electric Co. has published two bulletins, GEA-5900 and GEA-5896, describing and illustrating modern plant electric power distribution practices. Photographs and diagrams of entire systems and power equipment are given along with case histories of various industrial plants utilizing the systems.

21 ELECTRODES—Alloy Rods Co. has released Bulletin AR 53-16 on its line of Arcaloy electrodes. An explanation of the two basic types is given along with an analyses and color chart. Application photographs are also included.

22 END-LOADERS — Galion Allsteel Body Co. announced a technical bulletin, L-6911, describing its hydraulic end-loader, the LOADevator. Action photographs, mounting diagrams, operating hints and specification charts are included.

23 EQUIPMENT DEVELOPMENT—Denver Equipment Co. has prepared a 12-pg., illustrated bulletin, No. G3-B39, explaining the research and developments of various equipment, conducted in the company's testing laboratories. An illustrated list of equipment is given with sizes and capacities of each. Among the equipment covered are jaw crushers, agitators, concrete mixers, flotation machines, sand pumps, vibrating screens, etc.

24 FLOW METERS — Minneapolis-Honeywell Regulator Co., Brown Instruments Div., has issued a set of seven specification sheets describing and illustrating its flow meter line. Specification sheets 241 and 242 cover electric and mechanical evenly-graduated flow meter bodies while sheets 243 through 247 cover square root flow meters and liquid level meters. Also included are construction and engineering details and dimension data.

25 GRAVEL PLANT—Diamond Iron Works, Inc., has compiled a bulletin describing and illustrating the Series 100 portable gravel plant. Also included are specifications and features of the unit.

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about your business

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26 HANDLING PALLETS—The Refractories Institute has compiled a manual on the recommended equipment and procedure for the palletized loading and shipment of refractory brick. Drawings are used throughout to illustrate the standard wooden pallet, pallet load protection, carloading patterns, and standard wooden end and side gates.

27 HYDRAULIC TORQUE CONVERTER—Twin Disc Clutch Co. discloses in Bulletin 501 how its truck-type, three-stage hydraulic torque converter is applied to construction, highway transportation, mining, etc. Cutaway views show details of the intuilt braking feature in models DF and CF, and charts, graphs, and drawings point out various other features.

28 INDUCTION MOTORS — Allis-Chalmers Manufacturing Co. has released Bulletin 14B7733, a starter selection guide for squirrel-cage induction motors. Selection data and explanations of two or three-wire control is given along with enclosure and operating arrangements.

29 INDUSTRIAL SCREENS—The Colorado Fuel & Iron Corp. has issued Catalog 1249, describing its line of industrial screens, including lock mesh, long slot, rectangular opening, and various other special weaves and crimps. Applications of mesh cloth in stainless steel, brass, monel metal, etc. are discussed. Drawings of various types and sizes are given along with tables and specifications.

30 JAW CRUSHERS — Universal Engineering Corp. has released Bulletin U526, describing and illustrating its line of welded steel base, overhead eccentric jaw crushers in sizes 10 x 16 in. to 30 x 42 in. for gravel, rock, and ore crushing. Specifications and tables are included.

31 LOADERS—Stephens-Adamson Manufacturing Co. has published Bulletin 253 describing the features, operations and specifications of its various loading and unloading equipment. Typical application photographs and descriptions are given, along with cross-sectional views of equipment and operations.

32 MAGNET SEPARATORS—Eriez Manufacturing Co. has made available a four-page brochure describing the uses, advantages, construction and installation of its permanent non-electric Model C plate magnets. Typical installations of the separators are given with engineering drawings and photographs.

33 MILLIVOLIMETERS — Minneapolis-Honeywell Regulator Co., Industrial Div., has issued Specification Sheet 115 describing indicating pyrometers, resistance thermometers and tachometers of high resistance millivoltmeter type. Construction and engineering details are included.

34 PILLOW BLOCKS—Dodge Manufacturing Co. has published an illustrated Bulletin A-620 presenting the new all-steel Dodge-Timken pillow blocks. Cutaway view, technical information and data covering block in sizes ranging from 2 7/16 to 10 in. are included.

35 PRESSURE PIPE—Price Brothers Co. has published a 4-pg. folder listing the requirements for proposed water supply lines in question and answer style. Price prestressed concrete pipe is described and its construction details are discussed. A check list is provided for evaluation of the pipe under consideration.

36 PUMP—Yeomans Brothers Co. is distributing Bulletin 4600 describing and illustrating the Pneu-Pump, a pneumatic-ejector for low-volume materials such as acids, alkalies, oils, slurries, mud, brine, water, etc. Installation drawings, pump photographs, capacities and dimensions are also included.

37 REFRACTORY LININGS—Plibrico Co. offers a folder, Form No. 60, discussing methods of reducing waste in kilns and dryers through use of its refractory linings. Descriptions of its jointless firebrick and castable refractory products are also given.

38 SAND PUMPS—Denver Equipment Co. has issued Bulletin P10-B4, describing its vertical centrifugal sand pumps. Specifications, drawings and data sheet are included.

39 SAND RECOVERY—The Dorr Co. has released Bulletin 2501, explaining the advantages, operation and specifications of the Dorr-Clone sand recovery unit. A cross-sectional view of the unit is included.

40 SAW BLADES—Robert G. Evans Co. has available the "Handy Blade Selection Chart," with complete information and price lists of its Target diamond blades. Applications on masonry, concrete and asphalt saws, hand power, laboratory and lapidary saws are discussed.

41 SHOVELS—Caterpillar Tractor Co. has released an "Operator's Handbook," Form 30575, explaining various operations of cable and hydraulic shovels, through a cartoon-style pattern.

42 SLING FITTINGS—Electroline Co. has prepared a four-page brochure describing its wire rope choker sling fitting. Typical applications, close-up views and cut-away section showing socket arrangement are given.

43 SPECTROPHOTOMETERS — Beckman Instruments, Inc. has released a 28-pg. catalog, No. 303-288, of its ultraviolet and visible spectrophotometers, picturing sample cells and other accessories. Descriptions, illustrations, and a composite price list-index are also given.

44 SPRAY GUN—Blastcrete Equipment Co., Inc. has issued a pamphlet describing the construction, operation and maintenance of the Blastcrete gun. Specification data, typical application photographs and equipment features are included.

45 STEAM GENERATOR—Malsbary Manufacturing Co. has made available a leaflet giving advantages and descriptions of its line of steam generators for curing concrete block. The booklet contains construction details, selector guide, specifications and approximate costs.

46 TRACK ROLLERS—Caterpillar Tractor Co. describes and illustrates its track rollers in an eight-page booklet, Form 30738. Steps required in the production of track rollers are given, as well as a cut-away view of a recent model roller.

47 TRACTOR—R. G. LeTourneau, Inc. has available Bulletin TD-216 describing and picturing its Tournatractor, a high-speed, electrically-controlled, rubber-tired tractor. Action shots and cut-out photos of integral parts of the machine are given.

48 V-BELT — Allis-Chalmers Manufacturing Co. has released Bulletin 20B7786, describing "Texrope" V-belts for high-capacity operations. Drawings explaining uses are given.

49 WATER REPELLENT — I. Sonneborn Sons, Inc., has released a six-page bulletin which compares given results of Silicone water repellent tests. Tables and graphs are used to explain the test procedures and results. Case histories are included along with application directions.

50 WIRE ROPE—American Chain & Cable Co., Inc., Hazard Wire Rope Div., has announced a 16-pg. wire rope recomendations booklet, No. Dh-129B, for general contractors. Recommendations for bulldozers, back fillers, angle dozers, skimmers, etc. are given.

51 WIRE ROPE—Union Wire Rope Corp. has compiled "Sling Handbook and Riggers' Manual" giving details on its line of "Tuffy" slings. Instructions on seizing, socketing and types of splices are also included.

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51									

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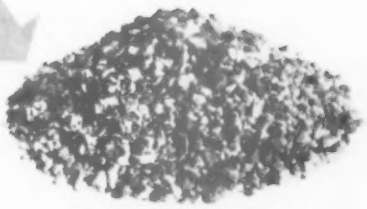
ATTRITION MACHINE FEED

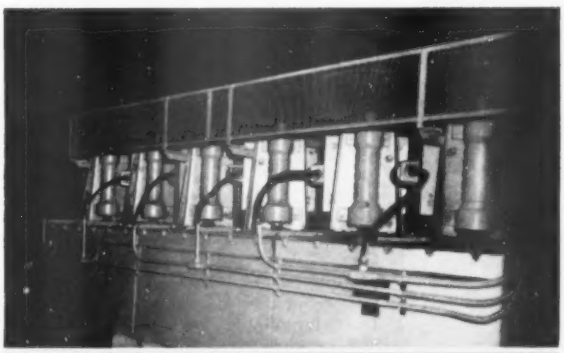
SLIME (TO WASTE)

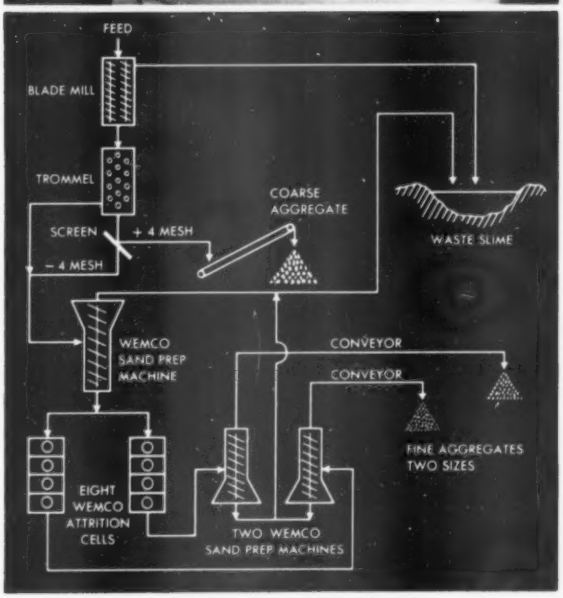


SPECIFICATION SANDS

If you have a clay problem–

Here's Proof of how **WEMCO** ATTRITION MACHINES *break down cemented materials*





The above photographs clearly illustrate how the Wemco Attrition Machine removes clay cementing material from sand particles in the plant of a California aggregate producer. With ordinary scrubbing methods this producer was unable to break down the cementing material present in order to meet State aggregate specifications. After installation of Wemco Attrition Machines, this operator was able to scrub loose the cementing material and then remove it by desliming. Note the clean, sharp sand particles produced in the process. The result was a higher profit aggregate of greatly improved quality which fully complied with State specifications.

The Wemco Attrition Machine is a new and more efficient method of washing sand particle surfaces by controlled turbulence of high density pulps. Its thorough abrading action literally scrubs the clay from sand particles more completely than methods formerly used and permits the recovery of clean aggregates for marketing.

Flowsheet of aggregate plant shows use of eight Wemco Attrition Machines in conjunction with two No. 48 Wemco Sand Preparation Machines. Previous to installation, operator was unable to meet fine aggregate specifications.

WRITE WEMCO TODAY for further information on how Wemco Attrition Machines can improve your aggregate operations. Wemco facilities are available for attrition tests on your samples, if desired.

WEMCO

WESTERN MACHINERY COMPANY

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MANUFACTURERS NEWS

Pioneer Engineering Works, Inc., Minneapolis, Minn., announces that Oscar J. Ellertson has been elected president of the company to succeed Melvin Ovestrud, who has retired, but continues as engineering consultant. Mr. Ellertson is the son of E. E. Ellertson, who helped to found and head the firm in 1928 after purchase of the crushing plant business from Caterpillar who in turn had bought it from Russell Grader Mfg. Co. Mr. Ellertson joined Russell Grader in 1923 and became purchasing agent of Pioneer when it was organized in 1928. He transferred to the sales department and held various sales positions, including assistant secretary and assistant treasurer, until 1950 when he was elected treasurer. He became vice-president in 1951 and has been in charge of production since 1952.

Oscar J. Ellertson

Mr. Ovestrud started with the company in 1928 as chief engineer, serving successively as vice-president and works manager, first vice-president, and then president.

General Electric Co., Schenectady, N.Y., has discontinued the small and medium motor department of the motor and generator division and has organized the following departments: marketing department, Walker H. Henry, manager, Schenectady, N.Y.; medium induction motor department, Olaf F. Vea, general manager, Schenectady, N.Y.; direct-current motor and generator planning study, Oscar L. Dunn, manager, Schenectady, N.Y.; and synchronous and specialty motor and generator department, Fred B. Hornby, general manager, Lynn, Mass.

Elwell-Parker Electric Co., Cleveland, Ohio, announces that C. Brenton Cook, vice-president and a director since 1942, has retired after 39 years of service with the company, which he joined in 1914 as Cleveland district salesman. He established the sales, advertising and export departments, and has been manager of sales promotion and advertising since 1915. He was named export manager in 1921, and vice-president and director in 1942.

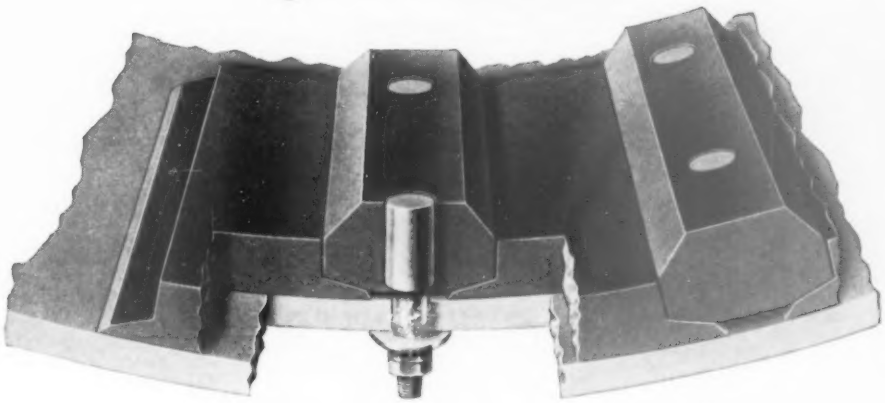
The Wellman Engineering Co., Cleveland, Ohio, has announced the appointment of Fred B. Shew as sales manager of the bucket department. He was formerly district manager in the Chicago office.

Union Bag & Paper Corp., New York, N.Y., announces that B. J. O'Hearn, former multiwall sales representative, has been named southwestern district manager for multi-

When you install

U·S·S LORAIN ROLLED PLATE LININGS

you save



Save on installation time and labor. Lorain Liner Plates are made to accurate size and in easily-handled sections . . . can be installed quickly and easily.

Save valuable grinding space. Because of the strength and resistance to breakage of the rolled steel from which U·S·S Lorain Rolled Plate Linings are made, plates of reduced thickness can be used, thereby increasing the usable diameter of the mill . . . boosting output.

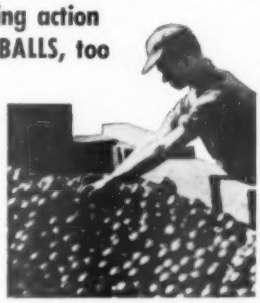
Save on "time out" for repairs. Close fits between ends of plates and between plates and lift bars of U·S·S Lorain Rolled Plate Linings eliminate shell wash and allied troubles which result eventually in costly mill repairs.

Save on replacement materials. Lorain Liner Plates are so rugged they'll wear 'til they're paper thin without failing! And because the plates are interchangeable, severe localized wear at feed or discharge ends of the mill may be balanced just by reversing the worn plates to the opposite end. You get the full life of your linings when they're U·S·S Lorain Rolled Plate Linings!

There are U·S·S Lorain Rolled Plate Linings to fit any type of mill—for wet grinding or dry. Available through leading mill manufacturers whose names will be furnished upon request.

For uniform, efficient grinding action specify U·S·S GRINDING BALLS, too

● For still lower grinding costs and higher grinding efficiency, specify U·S·S Grinding Balls for your mill. They're made to exacting specifications . . . are carefully tested from raw materials to finished product to assure surface hardness and maximum hardness penetration. Available in diameters from $\frac{3}{4}$" to 5". For further information send for our free booklet on U·S·S Grinding Balls.



United States Steel Corporation
Room 2813-G, 525 William Penn Place
Pittsburgh 30, Pa.

Without obligation on my part, please send me your FREE booklet on U·S·S Grinding Balls.

Name .....

Company .....

Address .....

City ..... State .....

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S LORAIN ROLLED PLATE LININGS AND U·S·S GRINDING BALLS

2-994

USS

UNITED STATES STEEL

wall bag sales in Colorado, Utah, Wyoming, Kansas, Missouri, southern Illinois, Arkansas, Louisiana, Texas and Oklahoma. E. T. Nelson, formerly assistant western district manager, has been named western district manager in North Dakota, South Dakota, Nebraska, Iowa, northern Illinois, Minnesota, Wisconsin and Michigan.

International Paper Co., Bagpak Div., New York, N.Y., announces the appointment of R. R. Worthington as assistant sales manager of the bagpak division. He was formerly sales manager of the machinery sales and service department of the division and will be succeeded in this position by O. W. McDuffie, who was in charge of the bagpak sales office in Kansas City.

Gilman Paper Co., New York, N.Y., has announced the appointment of Lawrence K. Norton as assistant to the vice-president and director of sales in addition to his duties as head of the sales department of The Cellucord Corp., a subsidiary. Kenneth Rawson, formerly New York and New England representative for the Kraft Bag Corp., also a subsidiary, has been named representative for the gummed tape and general paper sales divisions in the eastern territory.

The Thew Shovel Co., Lorain, Ohio, announces that R. H. Zeilman has been appointed director of engineering, M. L. Sheetz, chief executive engineer and O. Von Mehren, chief design engineer.

Mack Trucks, Inc., New York, N.Y., announces that W. Denis Kendall, executive vice-president of Brunswick Ordnance Corp., a subsidiary, has been appointed vice-president of Mack Mfg. Corp., with headquarters in Allentown, Penn.

International Paper Co., New York, N.Y., has opened a sales office in Dallas, Texas, to serve Texas and the Southwest.

Dravo Corp., Pittsburgh, Penn., has completed a new 30-min., 16-mm., sound color film entitled "Portrait of an Enterprise," depicting on-the-job scenes of heavy construction projects, river locks, dams and bridges. Pro-

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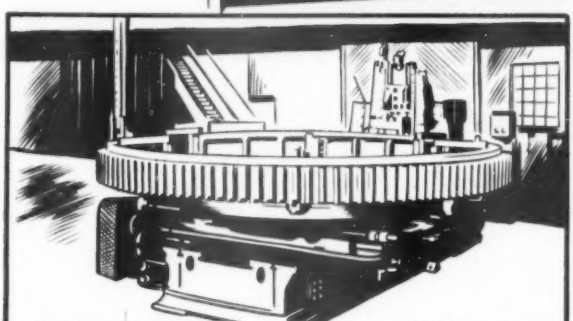
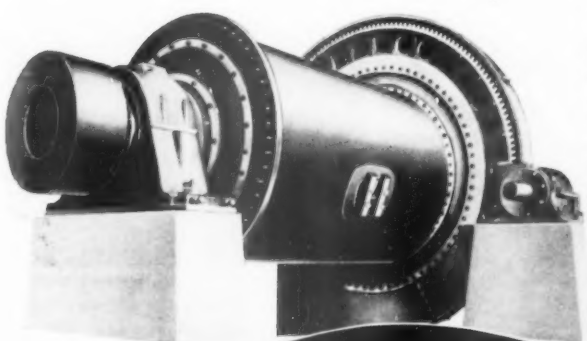
Every Traylor Grinding Mill is carefully built to specifications developed from data furnished by you, the customer. Because our Grinding Mills are "Traylored" to your needs, they assure a uniform product . . . of the right size . . . with practically no over-grinding.



Driving gears are steel . . . precision cut with high and low addendum on our Maag gear generator. This precision workmanship, in combination with pressure lubricated main bearings plus trunnions cast integral with detachable heads, results in one smooth working unit to reduce maintenance costs and cut down-time loss.

Production up! That's the result of combining Traylor's personalized attention with years of manufacturing experience. Buy a Traylor Grinding Mill . . . you'll see more profit dollars for every ton you process.



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Company: _____

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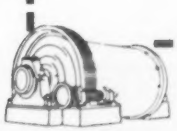
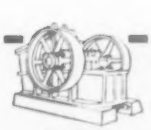
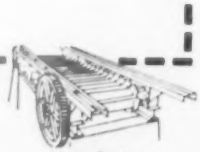


Ball Mills



Jaw Crushers



Apron Feeders

duction and distribution of river sand and gravel are highlighted, and emphasis is placed on engineering of all kinds. Film is available without charge for showing to engineering groups, schools and colleges by applying to the advertising department of the company.

Westinghouse Air Brake Co., Pittsburgh, Penn., has purchased the earth-moving and related business of R. G. LeTourneau, Inc., Peoria, Ill., including all fixed assets and machinery at Peoria, Ill., Toccoa, Ga., and its interest in the Australian subsidiary, for approximately $19,500,000, according to an announcement by Edward O. Boshell, president and chairman of the board of Westinghouse Air Brake Co. The new business will be operated as the LeTourneau-Westinghouse Co., a subsidiary of Westinghouse Air Brake. R. G. LeTourneau, Inc., will retain and continue to operate the Vicksburg, Miss., and Longview, Texas, plants, where special products for the U.S. Government, land-clearing equipment, cranes and other products, not related to earth-moving, will be manufactured.

Merle R. Yontz

Elmer Isgren

Officers of the new company are Merle R. Yontz, president; Elmer Isgren, executive vice-president; Herbert A. May, vice-president; John Schoen, vice-president and general sales manager; Warren Wemple, vice-president and controller; Ed Greiner, secretary and treasurer; Winston Simner, assistant controller, Herbert Kastien, assistant secretary; and Roy P. Yearick, assistant secretary and assistant treasurer.

John Schoen

Warren Wemple

Chain Belt Co., Milwaukee, Wis., has announced the appointment of Edward M. Rhodes as assistant to the general manager of the Baldwin-Duckworth division, Springfield, Mass. He was formerly sales manager of the division. Roland V. Poisson has been named assistant sales manager, and

William E. Kennedy, Jr., has been appointed supervisor of Duckworth automotive timing chain sales. Four new district sales engineers have also been appointed: William C. Beals in Buffalo, N.Y.; Robert B. Hill in Portland, Ore.; James W. Mueller in Chicago, Ill.; and Dabney P. Murrill in Atlanta, Ga.

United Steel Barrel Co., Philadelphia, Penn., has announced the purchase of Lessmann Mfg. Co., Des Moines, Iowa, from H. F. Lessmann, who is no longer associated with the firm. The company will continue to be known as the Lessmann Mfg. Co. Announcement has also been made of the appointment of Howard W. Dodson as vice-president, Elmer Mrozek as sales promotion manager, and Gerald T. Baker as production manager and engineer for Lessmann Mfg. Co. Mr. Dodson is also vice-president in charge of production of the United Steel Barrel Co., a position he has held since 1937.

Hercules Powder Co., Wilmington, Del., announces that Albert E. Forster has been elected president of the company and chairman of the executive committee. He succeeds Charles A. Higgins, who has retired after 38 years of service, but continues as chairman of the board. Mr. Forster joined Hercules in 1925 as a technical service man in the San Francisco office. He served in various positions until 1940 when he was elected a director. He became vice-president and a member of the executive committee in 1951.

Albert E. Forster

Mr. Higgins was chief chemist of the Union Powder Co. when it was purchased in 1915 by Hercules. He became assistant to the chemical director in 1916 and served as technical assistant to the general manager of the operating department from 1922 to 1926, when he was appointed manager of the development department. Two years later he was named a director and member of the finance committee. In 1929 he became a member of the executive, elected a vice-president in 1930, and chairman of the finance committee in 1936. Three years later he became president.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed General Equipment, Inc., Baton Rouge, La., as distributor in the parishes of Beauregard, Allen, Evangeline, St. Landry, Pointe Coupee, St. Mary, part of St. Martin, Assumption, Ascension, Livingston and Tangepahoa.

Columbia Machine Works, Vancouver, Wash., announces that its second plant expansion in two years, together with establishment of parts and depots and service centers in

California, Wisconsin, Mississippi, Florida, New Jersey, South Carolina, Virginia and Vancouver, has greatly increased production and service facilities .

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces that W. A. Roberts has been re-elected president of the company. Other officers re-elected are R. S. Stevenson, John Ernst, J. D. Greensward, W. E. Hawkinson, Harry K. Ihrig, J. A. Keogh, G. F. Langenohl, Frank Mussell, B. S. Oberlink, J. F. Roberts, J. L. Singleton, H. W. Story, A. W. Van Hercke and W. A. Yost, Jr.

Kaiser Aluminum & Chemical Sales, Inc., Chemical Div., Oakland, Calif., has appointed Philip A. Gaebe as senior sales engineer for basic refractories and chemicals in the Pittsburgh area. He was formerly in the production department at the Fontana, Calif., plant of Kaiser Steel Corp. James L. Willis, formerly plant metallurgist for Central Iron & Steel Co., Harrisburg, Penn., has been named senior sales engineer on the eastern seaboard.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich., has announced a new driver training and safety film entitled "Safety Saves," illustrating the "do's and don'ts" of safe driving. It shows the cause of most truck accidents and how to avoid them. Film is available for loan at above address.

Goodyear Tire & Rubber Co., Akron, Ohio, announces the appointment of R. B. Warren as manager of industrial products departments. He was formerly southern sales manager of the industrial products division and will be succeeded by L. W. Adams, who has been Pittsburgh district manager for the division since 1949.

Electric Steel Foundry Co., Portland, Ore., has opened a new branch office in Salt Lake City, Utah, to cover Utah, Colorado, southeastern Idaho and southwestern Wyoming. Garland T. Allen has been named manager of sales of the new branch.

Fairbanks, Morse & Co., Chicago, Ill., has announced the appointment of William B. Morse as manager of the Detroit, Mich., sales and service branch. He was formerly assistant to the manager and succeeds E. J. Hay, who died recently.

Hewitt-Robins, Inc., Stamford, Conn., has announced the appointment of Harold E. Kleintop as manager of wire product operations at the Philadelphia plant.

Hyster Co., Portland, Ore., has announced the appointment of J. W. Morgan as assistant sales manager of the eastern industrial truck sales, with headquarters in Danville, Ill. For the past year he has been a district manager.

Sauerman Bros., Inc., Chicago, Ill., announces that Louis McLouth has retired as advertising manager after 33

years of service. Melvin O. Martin has succeeded Mr. McLouth, who will remain temporarily in an advisory capacity.

Koehring Co., Milwaukee, Wis., has appointed the following distributors: Kelbe Bros. Equipment Co., Milwaukee, Wis., succeeds Cunningham-Ortmayer for the entire Wisconsin territory; Allied Equipment, Inc., Miami, Fla., succeeds Florida Equipment Co. in the 13 southern counties of Florida; and Standard Machinery Co., San Francisco, in the northern California territory. Other California distributors include the San Joaquin Tractor Co., Bakersfield, in the south-central sector and Harron, Rickard & McCone Co., Los Angeles, in the southern portion of the state.

Bemis Bro. Bag Co., St. Louis, Mo., announces that F. V. Deaderick, who is vice-president and director of eastern operations, has been elected a member of the board. R. Ramsay has been named secretary and comptroller, and David M. Finley has been made assistant secretary and assistant comptroller.

The A. O. Smith Corp., Milwaukee, Wis., announces the opening of a new service branch of the product service division at Oakland, Calif. George A. Carlson has been named manager of the new branch.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the appointment of George F. Cobb and Rudolph J. Ramstack, Jr., as assistant engineers in the crushing, cement and mining machinery sections of the processing machinery department.

The Transmission & Gear Co., Dearborn, Mich., has announced opening of subsidiary manufacturing plants in Dunkirk, Ohio (Transo Products, Inc.) and Coldwater, Mich. (Transo Mfg. Co.) for production of the Transo mixers and Transo front-end loaders.

Reo Motors, Inc., Lansing, Mich., announces the formation of the industrial and marine engine division. R. D. Jacobs, II, formerly with General Motors Detroit diesel engine division, will head sales activities and engineering developments.

United States Rubber Co., New York, N.Y., has announced the following appointments: John Blake, manager of state and municipal sales, New York; E. T. Corbus, manager of electrical utilities sales, New York; J. W. Loveland, eastern division sales manager, New York; C. R. Pickens, southeastern division sales manager, Atlanta, Ga.; and H. J. Cluver, middle-Atlantic division sales manager, Philadelphia, Penn.

Borg-Warner Corp., Chicago, Ill., has announced the appointment of Ray P. Johnson as director of sales research and Alonzo B. Knight as administrative assistant to the president.

The Colorado Fuel & Iron Corp., New York, N.Y., announces that L. A.

Watts has been named general manager of sales of the eastern division. He was formerly assistant general manager of sales of the Wickwire Spencer steel division.

Bailey Meter Co., Cleveland, Ohio, announces the appointment of A. L. Danielson as manager of the branch office in Denver, Colo. He succeeds G. M. Wallace, who was recently appointed assistant sales manager in Cleveland.

Gar Wood Industries, Wayne, Mich., has announced the appointment of H. J. Howerth, Jr., as assistant sales manager of the Wayne division. Mr. Howerth just returned from a year in Korea where he served as a captain with the Army Ordnance Corps.

Viber Co., Glendale, Calif., announces the appointment of Lee Redman Equipment Co., Phoenix, as Arizona distributor for Viber internal and external vibrators.

E. Lee Heidenreich, Jr., Newburgh, N.Y., industrial engineers, announces that Thomas L. Burrell of Decatur, Ga., has joined the firm as general manager of the construction division.

Fruehauf Trailer Co., New York, N.Y., has announced the appointment of Leslie E. Baker as manager of the Toledo, Ohio, branch. He was formerly sales manager of the Kansas City branch.

Lithibar Co., Holland, Mich., has appointed Robert E. Lee Graham as vice-president and general manager.

NEW INCORPORATIONS

Mt. Pleasant Ready-Mix and Supply, Mt. Pleasant, Iowa, has been incorporated with $25,000 capital stock. The company will deal in sand, gravel, crushed stone and ready-mixed concrete. Officers are Harry M. Coder, president, and Carl E. Burkey, secretary-treasurer, who will also serve on the board of directors along with Jessie A. Coder and Irene T. Burkey.

Ravenswood Sand and Gravel Co., Ravenswood, W. Va., was recently incorporated with an authorized capital of $100,000 and a working capital of $10,000. The incorporators are Elmer H. Dodson, Stanley E. Deutsch and Ione Hutchinson, all of Charleston, W. Va.

Blackfoot Ready-Mix Concrete Co., Boise, Idaho, has been incorporated by Donald Linton, Milton E. Zener and N. H. Patton, all of Pocatello, Idaho. Capitalization was listed as $25,000.

Andrews Concrete and Supply Co., Inc., Andrews, Texas, has been granted a 25-year corporation charter. Capital stock was listed as $5000. W. B. Lovelace, Nellie R. Lovelace and J. R. Graves are the incorporators.

Cook-McCann Concrete, Inc., Cheyenne, Wyo., was recently granted a corporation charter. Directors include John Cook, John McCann and William F. Benham, all of Cheyenne. John Cook has been named resident agent.

Murphy and Perkins Sand Co., Oklahoma City, Okla., has been granted a 50-year corporation charter. Capital stock was listed at $25,000. The incorporators are Dewey Perkins, C. J. Murphy and Pete Perkins.

Brazos Sand and Gravel Corp., Abilene, Texas, has been incorporated by F. O. Thomas, Edward Creel and Floyd Childs. Capital stock was listed at $10,000.

C. & L. Cement Works, Inc., Cleveland, Ohio, has been incorporated by Alfred C. Jones. Capitalization consists of 100 shares of no par common stock.

Southeastern Stone Co., Inc., Aiken, S.C., has been incorporated with a capital stock of $25,000. W. R. Carson has been named president of the company.

Fox Valley Sand & Gravel, Inc., Ripon, Wis., has been incorporated by Wesley Meilahn. Minimum capital was listed at $500.

North Star Sand & Gravel Co., Inc., Seattle, Wash., has been incorporated by Albert La Pierre, Jack Peterson, Roger E. Dunham and Mildred E. Hill.

Figuero Sand & Gravel Co., Yuma, Ariz., was recently incorporated by Henry D. Figueroa.

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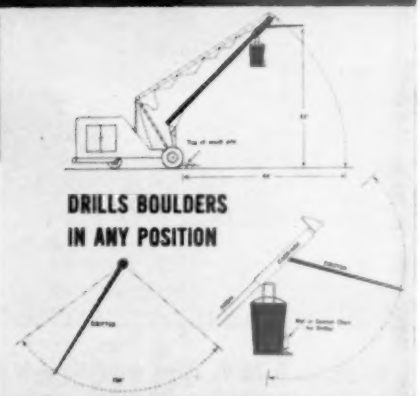

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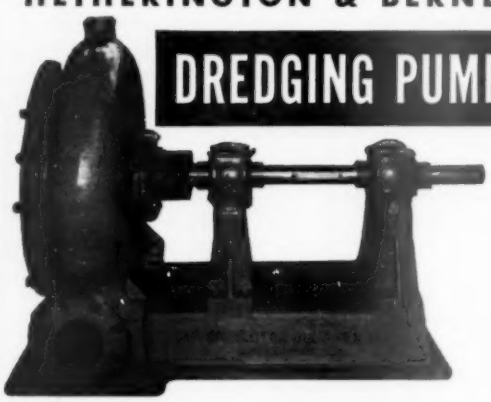

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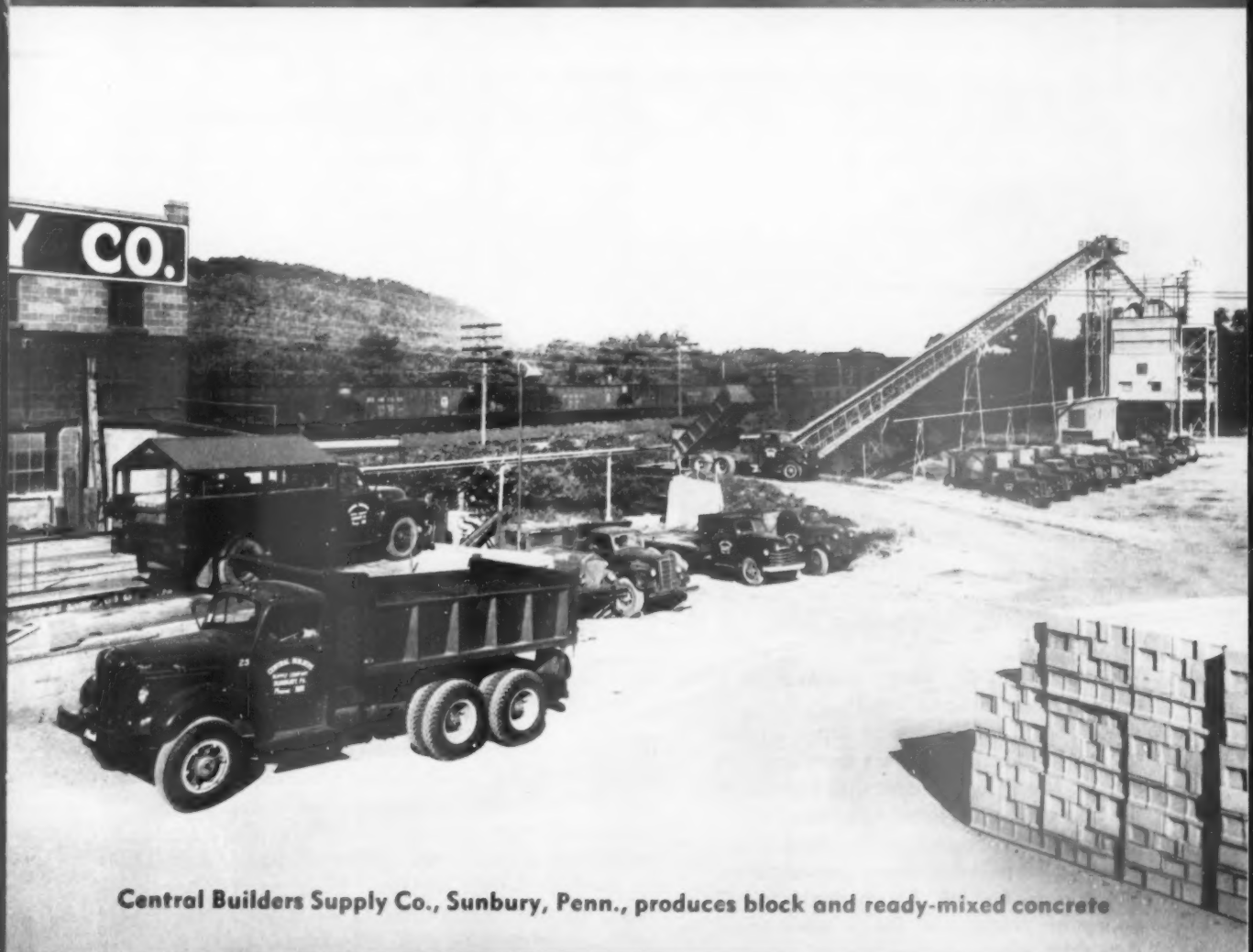
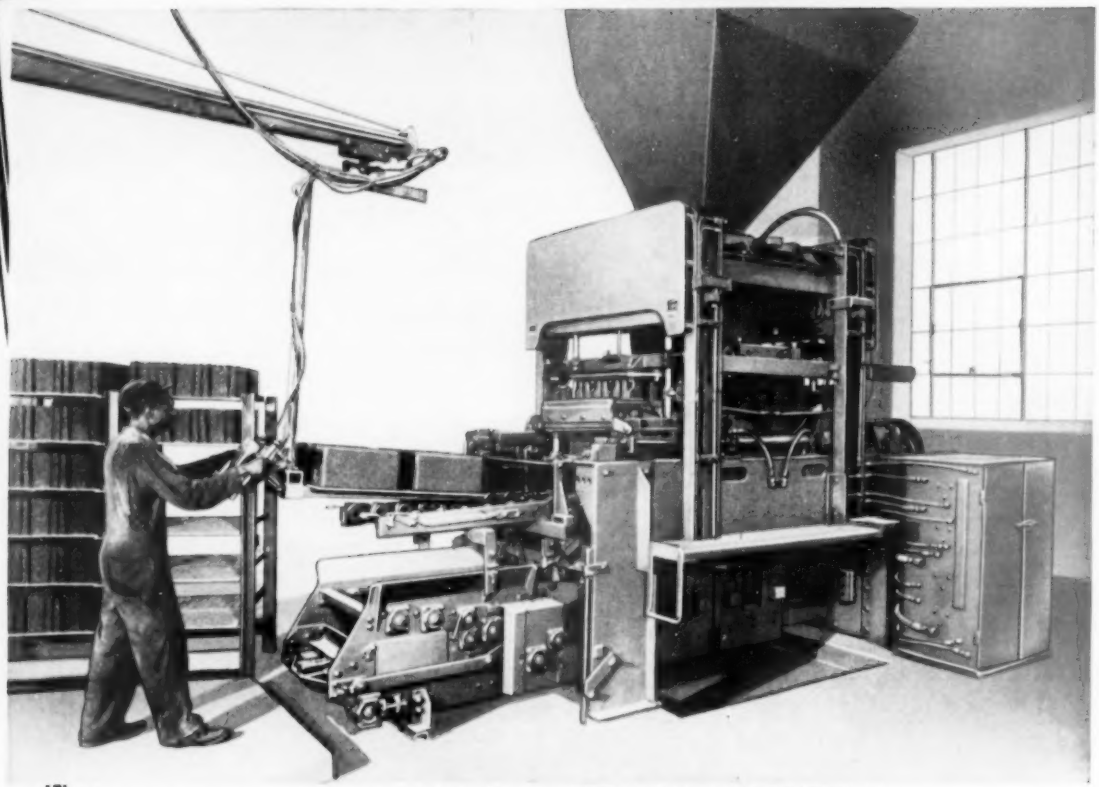
CONCRETE UNITS · READY-MIXED CONCRETE



Central Builders Supply Co., Sunbury, Penn., produces block and ready-mixed concrete

The "King" RULES



because it's RIGHT!

Yes, the GOCORP "King" is tops in each area in which it operates. That's because the blocks it makes are so superior, and are produced at a cost less than ordinary blocks. Here's a machine that represents the best and latest thinking of men with a lifetime of experience in this field. Block plant owners who have investigated, like the owner of this typical "King" operation, recognize these advantages GOCORP offers:

- Hydraulic "sequence operation"— for high quality blocks, low maintenance.
- Vibrating mold filled directly from main supply hopper—no feed drawer.
- Intense vertical vibration, combined with pallet-to-mold clamping, assures compact, uniform units.
- "Tomorrow's machine today" — removes obsolescence risk.

These are only a few reasons why the GOCORP "King" rules. If you want three or four cycles per minute—six blocks per cycle—with one operator—simultaneous production of two sizes, if desired—write for further details on the "King" and name of our representative near you.

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INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S COVER of CONCRETE PRODUCTS may be seen the convenient method of handling aggregates and cement to the ready-mixed concrete batching plant and block plant of Central Builders Supply Co., Sunbury, Penn., a description of which appears in this issue. Cement is pumped into bins and auxiliary tanks from a railroad track hopper, and aggregates are dumped by trucks to a hopper feeding a conveyor belt inclining up to the top of the plant.

To Add Pipe Plant

WASHINGTON CONCRETE CO., Washington, Iowa, has announced plans for the addition of a concrete pipe plant. Pipe will be produced in sizes ranging from 12 to 60 in. in dia., in 4- and 6-ft. lengths. The company, established in 1931, also produces concrete culverts and ready-mixed concrete. R. E. Arthur is manager and part-owner.

Sponsors Concrete School

MATERIAL SERVICE CORP., Chicago, Ill., recently sponsored a course in concrete for its employes, which was held by special arrangement at the Illinois Institute of Technology. The course, the first of its kind in the Chicago area, was designed to give the company's employes a fundamental understanding of the production and placing of quality concrete. Although employes were under no obligation to attend, over 300 completed the course. All classifications of employes, from ready-mixed concrete truck drivers to salesmen and executives, were represented.

Two-hour class sessions, held one evening a week for seven weeks, were under the direction of Benjamin A. Wasil, assistant professor of Civil Engineering at I.I.T. Instructors included experts from the cement and construction industries. Movies, laboratory demonstrations and panel discussions were featured.

The course began with a basic discussion of the various types of cement and aggregate. Material Service techniques in proportioning were emphasized in the second and third sessions. Following sessions covered admixtures; forming, placing, finishing and curing of concrete; and prospecting, processing and distribution of sand, gravel and stone by Material Service. At the closing session, factors and practices contributing to faulty concrete during the preparation and placing phases were brought out.

Correction

IN THE REPORT OF THE 45TH ANNUAL CONVENTION of the American Concrete Pipe Association, appearing in the April, 1953, issue of ROCK PRODUCTS, p. 236, H. W. Chutter, manager, Jourdan Concrete Pipe Co., Fresno, Calif., and also president of the Western Concrete Pipe Association, was quoted as saying he had used fine pumicite in the mix with resulting increase of strength, but the pumicite had *speeded up* the set. This should have read that the pumicite had *retarded* the set.

•

FRED BURBANK, formerly associated with San Diego Transit Mixed Concrete Co., San Diego, Calif., has established a ready-mixed concrete plant at Yreka, Calif.

Examining lecture equipment used during concrete course are, left to right: Sidney Marks, Material Service Corp., vice-president in charge of sales; W. T. McClenahan, chief testing engineer of the Sanitary District; Al Holoway, district sales manager of Master Builders; and B. A. Wasil, Civil Engineering Department, I.I.T.

PORTLAND INDUSTRIES, INC., which recently acquired the Wilson Concrete Products plant at Port of Palm Beach, Fla., is currently completing extensive additions to the Wilson plant at a cost of approximately $500,000. Officials of the expanded operation include Ben P. Gale, president, and Charles R. Wilson, vice-president.

CONSUMERS CO., Chicago, Ill., is building a new machine shop and garage facilities at its McCook quarry location. Recent expansion also includes new warehouses and garage facilities at the company's No. 79 yard, and the purchase of Lake County Ready Mix Co., which has plants at Upton and Crystal Lake, Ill.

EAST TEXAS TRANSIT MIX CONCRETE Co. has been established at Silsbee, Texas, by A. E. Johnson. Plant facilities include a 12- x 30-ft. office and storage building; an 800-bbl. cement storage bin; a 100-ton sand and gravel bin; a ¾-cu. yd. dragline; and three 3½-cu. yd. transit-mixer trucks.

COGLEY READY-MIX CO., Council Bluffs, Iowa, formerly owned by Lloyd Cogley, has been sold to Ralph M. Frazier, Iowa-Nebraska Insulation Co., Council Bluffs, who will operate the plant under the name of Iowa Ready-Mix Concrete Co.

VELMA CONCRETE CO., Duncan, Okla., has been purchased by R. E. Stokes, who will operate the plant under the name of Stokes' Transit Mix, Inc. Mr. Stokes was formerly associated with Standard Paving Co., Lawton, Okla.

HAROLD G. BEDWELL, Fall City, Neb., is installing a ready-mixed concrete plant in connection with the Independent Lumber Co.'s material yard at Fall City. Facilities include a batching plant, elevator and two 3-cu. yd. transit-mixer trucks.

LONE JACK LIMESTONE CO., Glasgow, Va., has established a ready-mixed concrete plant at Buena Vista, Va., which will be operated under the name of Buena Vista Ready Mix Concrete Co.

SMITH CONCRETE PRODUCTS, Columbus City, Iowa, has been purchased by Kenneth Kern. The company produces "Norwalk" concrete vaults and septic tanks.

BUFFALO WILBERT VAULT WORKS, Buffalo, N.Y., has announced a change in its firm name to Buffalo Burial Vault Works.

A READY-MIXED CONCRETE PLANT is being established at Herington, Kan., by Lester F. Oborny, contractor, Lincolnville, Kan.

ATLAS BUILDING MATERIAL CORP., has started operation of a ready-mixed concrete plant at East St. Louis, Ill.

NO DOUBT

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LOWEST WEIGHT

Yes, every possible ounce of *unneeded* weight has been taken out of Rex Adjusta-Wate Moto-Mixers.® You can be *sure* because only Chain Belt Company uses *electronic strain gauges* to test every part of a Rex Moto-Mixer. Every part is just the right weight for the job it has to do . . . *not* too heavy, *not* too light! You're sure that Rex is the lowest weight that it can possibly be and still assure lowest operating and maintenance costs.

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You can be equally *sure* that the Rex Adjusta-Wate design takes full advantage of the weight laws in any state. You have true flexibility in mounting . . . can mount a Rex on the truck of your choice for biggest legal payloads and still have . . . *shortest wheelbase . . . ample rear wheel clearance for proper discharging . . . best possible over-all weight distribution on the truck.* PROOF . . . just ask the operator who has Rex Adjusta-Wate!

Ask your Rex Distributor to give you the complete facts on the Electronic Strain Gauge Tests and the Rex Adjusta-Wate Design. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

A VERITABLE Bulldog OF A FLOOR!

'INCOR' CUTS CONCRETING COSTS 35% ON HEAVY-DUTY FLOOR FOR MACK TRUCK'S 8½-ACRE NEW JERSEY PARTS WAREHOUSE

MACK TRUCK INC. PARTS DIVISION
Bridgewater Township, N. J.
Contractor: D. O. EVANS, Hillside, N.J.
Architect: HERMAN F. KUZEL
Dunellen, N. J.
Ready-Mix 'Incor' Concrete:
COMMONWEALTH CONCRETE CO.
Bound Brook, N. J.

● The more popular the truck, the greater the need for good service facilities, supported by a reservoir of parts, such as this huge, new MACK TRUCK Parts Warehouse, near Somerville, N.J.

Mack builds stamina into its trucks, and it engineers this quality into buildings, too. Witness the use of 'INCOR' 24-HOUR CEMENT for heavy-duty floors in this 8½-acre warehouse.

Easy-working 'Incor' mixes cut placing and finishing costs. Example: The Ready-Mix Operator on this job was unable to supply 'Incor' for several days, and *D. O. EVANS, Hillside, N.J., General Contractor, says that, on switching back to 'Incor', his costs dropped 35%.*

Here's Why They Ask for 'Incor'

Above all, 'Incor' helps assure a stronger, longer-lasting floor, by curing *thoroughly* in the short time concrete can be kept wet—and thorough curing is vital to wear-resistance.

Another good reason why so many users ask for 'Incor'—and why so many Ready-Mix Operators make 'Incor'* concrete available as part of their good service.

*Reg. U. S. Pat. Off.

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THE ENTIRE CONSTRUCTION FIELD

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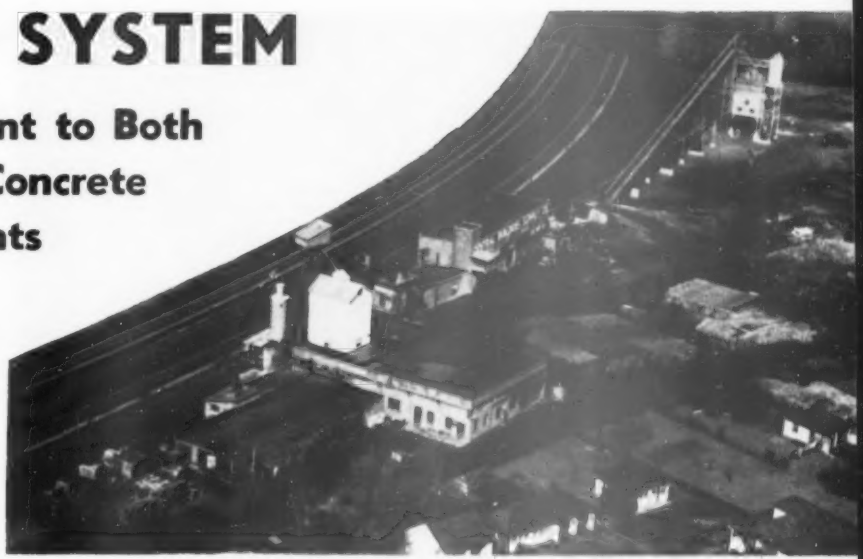
PUMPING SYSTEM

Supplies Cement to Both Ready-Mixed Concrete and Block Plants

Central Builders Supply Co., Sunbury, Penn., conveys cement from track hopper to both ready-mixed concrete and block plants. Also manufactures dual-cored concrete panel, concrete beams and burial vaults



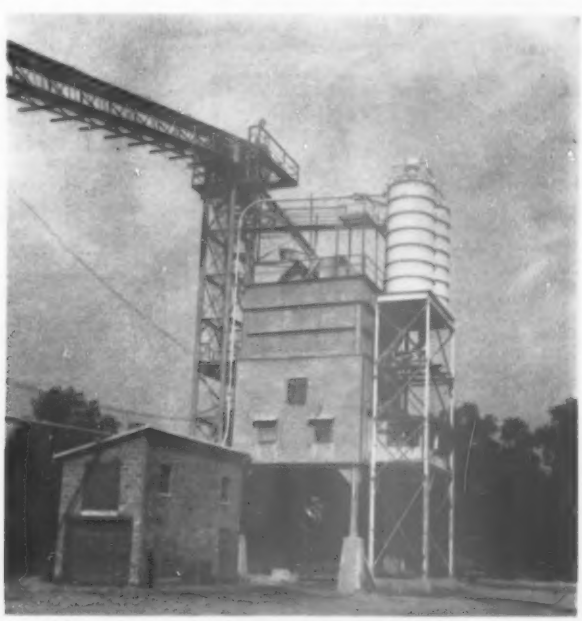
Cement is pumped from block plant silo (white superstructure to the left) to the ready-mixed concrete plant, upper right

By WALTER B. LENHART

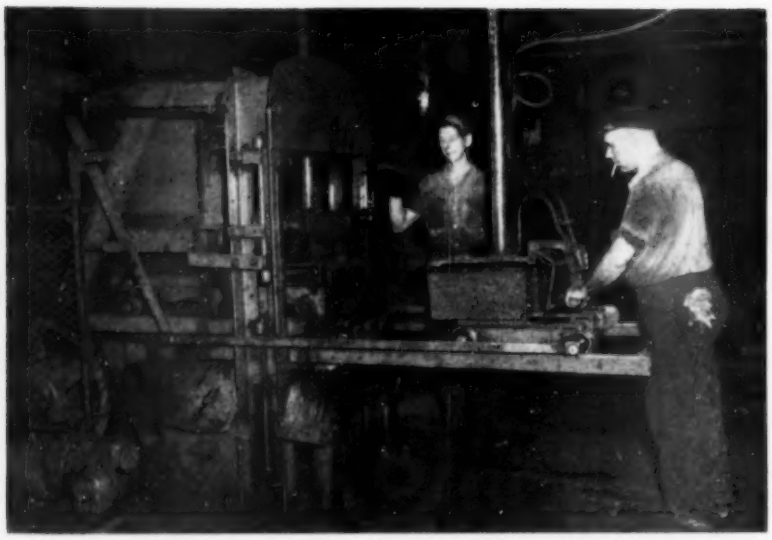
ONE OF THE LEADING and most progressive ready-mixed concrete and concrete block manufacturing companies in the East is the Central Builders Supply Co., Sunbury, Penn., which was established in 1928. In August, 1949, the method of handling bulk portland cement was modernized. It is possibly the only operation of its kind in the United States to use Fuller airslides and Fuller-Kinyon pumps for transportation of portland cement to both a block plant and to a ready-mixed concrete batching plant. Pumping dry portland cement with the Fuller-Kinyon system is quite old, and is used almost universally in the portland cement industry and on many large concrete construction jobs. The use of airslides for transportation of portland cement, especially to the concrete block manufacturer, is relatively new. One of the first block producers to use airslides was V. Paturzo Bros. & Son, Inc., Baltimore, Md., described in ROCK PRODUCTS, June, 1951, page 175. The system involves the use of a slightly inclined steel rectangular chute or launder that is divided horizontally by a porous membrane. Low pressure air is admitted in the lower portion, dry portland cement in the upper. Small amounts of air go through the membrane causing cement to assume the properties of a liquid and the cement flows to its destination. It is a simple and trouble-free system.

Cement Handling System

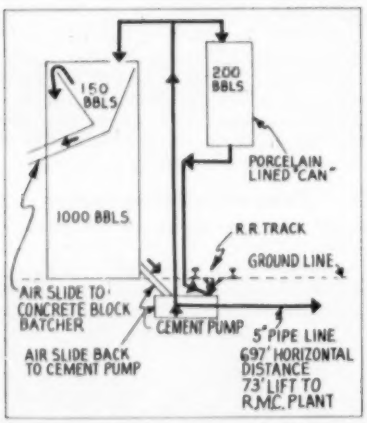
At the operations of the Central Builders Supply Co., bulk air-entrained cement from the Lehigh Valley cement district is delivered to the plant over the Pennsylvania railroad tracks. A track hopper serves the Fuller-Kinyon pump that is mounted in a small basement structure near the unloading point. The Fuller-Kinyon pump delivers to the top of a silo in



Left: Bucket elevator for aggregates and cement silo at the block plant. The 200-bbl. cement "can" in foreground is porcelain-lined. Right: Aggregate bins and weigh batcher for ready-mixed concrete. The two porcelain-lined "cans" each hold 200 bbl. of cement



Vibrating type machine for the production of concrete block



Cement pumping layout at ready-mixed concrete plant

which there is an over-flow cone. The cone holds 150 bbl. of cement with the remainder of the silo holding 1000 bbl. The outlet of the over-flow cone discharges to a Fuller airslide which delivers the cement to the weigh batcher in the block plant. Alongside the larger silo are three smaller "cans" holding an additional 200 bbl. of cement. They are porcelain-lined and were previously used in a brewery. Portland cement from either storage silo can be sent back to the Fuller-Kinyon pump; cement from the cans moves by gravity, and from the larger silo by the second air slide. A two-way valve controls the flow of this cement (or cement direct from the car) so that it can be pumped a considerable distance to the ready mixed concrete batching plant. Cement is pumped a horizontal distance of 697-ft. with a lift of 73 ft. The pump is a 6-in. Type H unit which delivers through a 5-in. steel pipe line. Air for the pump is from a Fuller rotary compressor powered with a 60-hp. motor. The pump itself requires an additional 60-hp. motor. Airslides are supplied air from a 48-oz. maximum-pressure blower powered by a 5-hp. motor.

At the Butler weigh-batching, ready-mixed concrete plant, the cement is stored in two porcelain cans similar to those referred to in the block plant. Aggregates for the batcher are trucked to the truck hopper serving a 297 ft. long inclined belt conveyor that delivers to a 300-ton capacity Butler bin over the 4½-cu. yd. weigh batcher. The company operates a fleet of Mack trucks that carry Ransome and Jaeger mixers. There are three 3-cu. yd. units; four 4½-cu. yd. and two 2½-cu. yd. mixers.

Block Plant

The block plant uses a No. 9 Stearns Joltcrete machine with Blaw-Knox cement weigh batcher. Both cinder and sand and gravel aggregate block are manufactured. Cinders are crushed in a set of rolls and screened. Curing is by low pressure steam with a vertical boiler, taken from an old Marion steam shovel, as the source of steam. Fuller bin indicators are used on the important bins. To handle block in and around the plant, the company has two Erickson fork trucks, and a L. L. Parker electric platform truck.

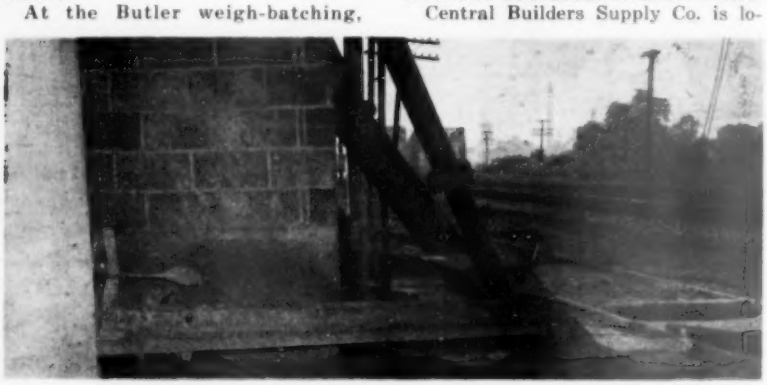
The company has its own sand plant at Selins Grove, Penn., where roughly 300 tons per day of sand and gravel are processed. All aggregates are trucked to the company's plant located at Island Park, Sunbury.

The company also manufactures burial vaults, and usually one skilled technician does all the work relating to this operation, including sales and delivery. The company has developed a unique truck haulage system for handling burial vaults that was described in ROCK PRODUCTS, December, 1952, page 80.

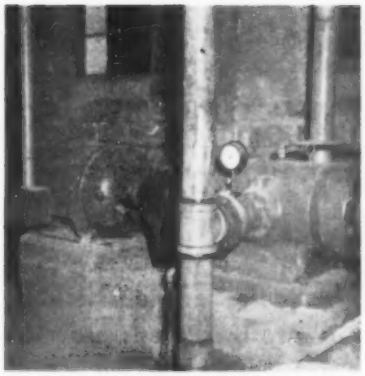
The company, headed by A. B. Markunas, is very active in the development of a new type dual-cored concrete panel, the invention of Paul M. Muspratt. The panels are made in 2-ft. widths, and in lengths of 4, 8 and 12 ft. The panels are cored, both vertically and laterally, in the panel using a low-slump, vibrated concrete. The Muspratt concrete beam is also another item that is to be exploited by this company. The beam is a cable-stressed unit that can be disassembled.

Central Builders Supply Co. is lo-

In the basement, below and near the main storage silo, is the 6-in. cement pump



Air-slide transports cement from the bottom of silo to the cement pump which serves the ready-mixed concrete plant



Compressor supplying air for cement pump

cated at Island Park, Sunbury, Penn. Officers and department heads of the company are as follows: A. B. Markunas, president and general manager; I. C. Longacre, vice-president and sales manager; E. R. McKinney, secretary and plant superintendent; W. E. Angstadt, treasurer and office manager; R. E. Longacre, concrete technician, transit mix; John H. Mowery, sand plant superintendent; and M. H. Bonawitz, master mechanic and chief of maintenance.

Concrete Masonry Homes

COLUMBUS CONCRETE BLOCK ASSOCIATION, INC., Columbus, Ohio, as a part of its promotional program, has published a book containing 36 plans for contemporary concrete masonry homes. The plans, designed by members of the Columbus chapter of the American Institute of Architects, feature simplicity of design and convenience for living, using concrete masonry to its best advantage. The book includes plans for 1-story homes, 2-story homes, homes with half-stories allowing for future addition of a room, plans with and without basements, and some plans featuring attached garages. Sizes range from 720 to 1781 sq. ft. and each plan is designed to conform with F.H.A. requirements and local building codes. Included with each plan are such data as minimum lot requirements, number of masonry courses, and preferable direction for the house to face.

Masonry Promotion

THE NATIONAL CONCRETE MASONRY ASSOCIATION recently announced that it has appointed Prof. J. R. Carroll, Jr., University of Illinois, to prepare a technical manual on the utilization of concrete masonry floors in combination with warm-air radiant heating. Prof. Carroll has had several years experience in the research, design and installation of radiant heating systems.

The manual, which is expected to be completed sometime in 1953, will be printed and distributed to association members for promotional use.

Northwestern Block Producers Meet

THE PACIFIC NORTHWEST MEMBERS of the National Concrete Masonry Association met in Portland, Ore., April 25, 1953, with nearly all major producers in that region represented.

The meeting was in the nature of a block manufacturers' clinic, with representatives of the various firms participating in panel discussions covering the following three major phases of the block industry:

1. Problems of Block Production and Their Solution. Leader of the panel discussion was Eric J. Hayford, Layrite Concrete Products, Spokane, Wash., assisted by panel members, John Hutsell, Associated Sand and Gravel Co., Everett, Wash.; and Wallace Beardsley, production manager, Layrite Concrete Products, Seattle, Wash.

2. Sales and Promotion. This panel was led by George P. Duecy, Associated Sand and Gravel Co., Everett, Wash., with Robert W. Condon, Graystone Concrete Products Co., Seattle, Wash., Gayle R. Dutton, Layrite Concrete Products, Spokane, Wash., and Paul L. Nutt, Smithwick Concrete Products, Portland, Ore., as members of the panel.

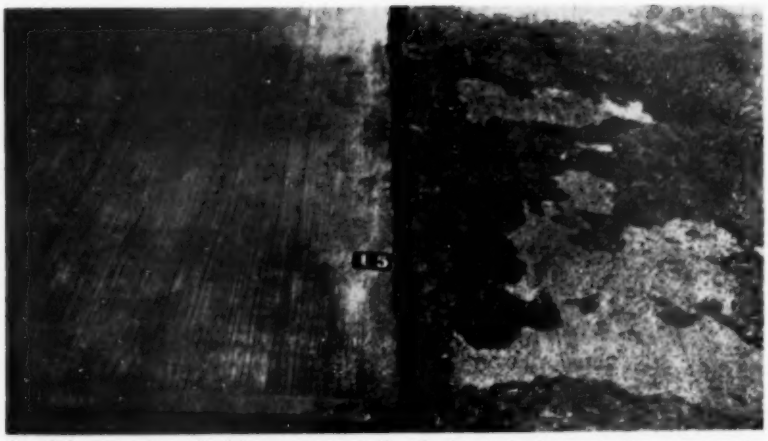
3. Engineering and Research. Discussion leader was Robert Lochow, engineer, Portland Cement Association, Seattle district office, assisted by panel members, James Holroyd, Holroyd Co., Tacoma, Wash.; Ellis Cummins, Yakima Cement Products Co., Yakima, Wash.; and Verne Frese, Layrite Concrete Products, Seattle, Wash.

Principal speakers at the meeting were Prof. Albert H. Schrieber, College of Business Administration, University of Washington, Seattle, who discussed "Profit Administration in Competitive Markets," and William P. Markert, director of promotion, National Concrete Masonry Association, Chicago, who presented the proposed N.C.M.A. program in the field of promotion. At the conclusion of Mr. Markert's talk, the program proposed received the unanimous endorsement of the more than 60 representatives of the block industry present.

The conference was climaxed by a cocktail party and dinner. Guest speaker was Fred L. Peterson, mayor of Portland, who spoke on "Building the Pacific Northwest."

A planning committee to arrange for future meetings was appointed by Carl Smithwick, a director of N.C.M.A., president of Smithwick Concrete Products of Portland, and also chairman of the meeting. The committee members consist of Harold Lutes, president, Layrite Concrete Products, Spokane; Ellis Cummins, Yakima Cement Products Co., Yakima; Fred Kettenring, president, Graystone Concrete Products Co., Seattle; George Duecy, Associated Sand and Gravel Co., Everett, Wash.; M. R. Gibbons, Builders Supply Co., Medford; Frank Spangler, president, Empire Building Materials Co., Portland; Ray McCleery, McCleery and Weston, Vancouver, B.C.; and Verne Frese, president, Layrite Concrete Products, Seattle.

Pacific Northwest Regional N.C.M.A. group concludes conference with banquet which was attended by representatives and guests from Oregon, Washington, Idaho and British Columbia



Unscaled pavement at the left was constructed with air-entrained concrete. Pavement to the right was built at the same time with similar aggregates and methods, except for air-entraining agent, showing 75 percent of the surface scaled

9. A producer views the ready-mixed concrete business . . .

By JAMES A. NICHOLSON*

This is the second article on air-entrained concrete, the first having appeared in May

AIR-ENTRAINED CONCRETE

THE PRESENCE OF PURPOSEFUL AIR greatly increases the resistance of concrete to the disintegrating action of freezing and thawing. The entrained air, in the form of minute disconnected bubbles, provides spaces where forces which would cause disintegration, can be dissipated. Because of these spaces, the use of heretofore troublesome aggregates and cement has been made possible. Also, the minute disconnected air bubbles, by sharply reducing bleeding and segregation in the fresh concrete, tend to prevent capillary and water channel structure in the hardened concrete.

Durability and other properties of concrete are materially improved by the purposeful entrainment of controlled air. The improvement in durability is very great; at times, to an extent, almost unbelievable. Studies of projects completed during the past 15 years testify to the durability of air-entrained concrete.

All of us know that durable concrete roads were built in frost areas as long ago as 1900, long before the development of air entrainment, and even before we understood the effects of water on the strength of concrete. Such roads have recently been tested. Unintentionally, probably due to cement processing conditions, in all these long lasting roads, the concrete has been found to contain the protective percentage of air. Tests on these old roads prove that for 50 years, air entrainment has made durability records with some concretes of which air was an unrecognized ingredient.

Air entrainment permits the production of concrete that is more resistant to weathering, sea water and de-icing salts. Air entrainment increases the resistance of concrete to chemical attack.

Entrained air acts as an added flexible aggregate and improves greatly the workability of concrete. The improved workability results even with the use of more angular and more poorly graded aggregates. The minute, disconnected air bubbles, capable of complete flexibility in shape, are a new, cheap and very important source of lubrication. Because of the entrained air, a truly plastic concrete is obtained. Through the lubrication values of the entrained air, a lower slump, just as placeable, concrete is made possible.

Through air entrainment, a lower water-cement ratio can be used, producing a more watertight concrete. Air-entrained concrete has proven to be about three times as impermeable as plain concrete. Less water is required to produce a given consistency. Bleeding and segregation are greatly reduced. The mixture is more cohesive. The presence of minute spheroids of air is so important that entrained air must be recognized as a new ingredient in concrete.

Disadvantages

The advantages of air entrainment are many and they are important considerations. Are there disadvantages? There are some. Concrete authorities generally agree that disadvantages are relatively unimportant. We go a step farther and say that in properly processed concrete, in the range of mixes handled by the ready-mixed concrete industry, disadvantages are practically non-existent. In failing to properly design and process concrete, air entrainment, uncontrolled, may lead to dangers. In exposed concrete, too little air might be almost as bad as no air at all. In concrete over which mineral topping is to be placed, too much air can get you into serious trouble. Fast mixing, which tends to produce big air bubbles, might cause additional air and water pits at the forms.

The principal disadvantage is said to be a reduction in strength. Concrete authorities generally agree that in concrete up to and including 5½ bags of cement, there need be no loss in strength. In 4- to 5-bag concrete, a slight gain in strength is acknowledged. No one denies that in the richer mixes, with present methods of compensating for air, strength losses around 10 percent for given slump concrete are to be expected. Indeed in richer mixes, even if you use a slightly lower slump which will place the concrete just as efficiently, you will still get about a 5 percent loss. That is certainly not an important loss, but it is still there. On such a basis, some specification writers have ruled out the use of air-entrained concrete for inside slab work. In the face of the many proven benefits of air entrainment, this appears to be another foolhardy restriction.

There is a history of cases, involving certain concrete surfaces—on which minerals or colored materials have been used to produce a given surface treatment—where the use of air entrainment is discouraged. In fact, some manufacturers, in their specifications, prohibit the use of air-entrained concrete. Their real objection is not to the use of air, but to the abuse of air entrainment. Uncontrolled air, on the high side will lead to a popping action—will destroy the bond. At our own operations, in hundreds of such cases, we have always

*President, Nicholson Concrete Co., Toledo, Ohio

used air-entrained concrete. There has not been one failure. Always, we keep such concrete on the low side of air content at 3-4 percent.

We have experienced no difficulty with pitting at the forms. Our single important problem has been an occasional low strength cylinder of concrete with 6- to 7-bag cement content. We believe that a fair appraisal of this strength problem will develop the conclusion that the trouble was not due to the presence of air but rather to such difficulties as improper design, material short-comings or incorrect testing procedures.

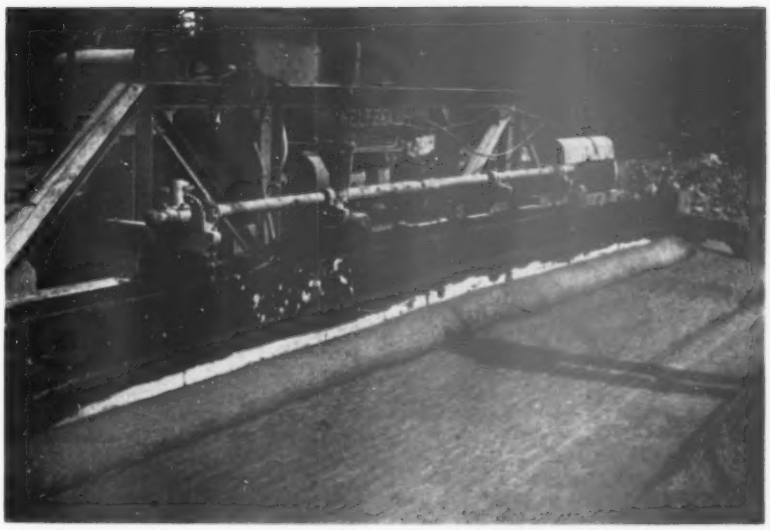
Undoubtedly, the adding of air automatically reduces strength. As Ed Brickett (Hume Pipe Co. of New England, Inc., Swampscott, Mass.) so cogently phrases it, "There is no strength in a hole." However, in 4-bag concrete, if you put in 4 percent air, you can take out about 5 gal. of water and come up with the same consistency. With such sizable reduction in the water-cement ratio, the hardened concrete with air will show a greater strength than plain concrete. In a rich mix, you might be able to take out only 2 gal. of water. The mix is already quite workable. There would not be a sufficient reduction in the water-cement ratio to compensate for the air voids which you have introduced. A strength loss would result.

The strength problem has been stated this way: In the lean mixes, large reductions in the water, required to produce a given consistency, offset the decrease in strength caused by additional air voids. In the richer mixes, the water reduction, (being less in percentage), is not sufficient to offset the effect of added air.

The way to overcome the disadvantages, (real or fancied), is to handle intelligently the factors of air entrainment. This is done by properly designing the mix and by controlling the amount of entrained air to fit intended job use.

If no advantage was taken of the water reduction, which the added air permits, the strength of air-entrained concrete would be about 5 percent below that of plain concrete for each percent of air entrained. If you compensate, differences in strength between plain and air-entrained concrete are largely dependent upon how much the water can be reduced to reach a certain slump.

All authorities agree that you can compensate for the added air by taking a material reduction (both in water and aggregate) and that you can use a lower slump air-entrained concrete to handle a given placing condition with equal efficiency. Concrete authorities should consider an additional step of compensation; in that for any placing condition, air entrainment permits the use of a larger top-size aggregate. The better workability of the concrete, (together with its cohesiveness), is the reason a larger top-size aggregate can be efficiently used. When larger top-size aggregate is permitted, a substantial improvement in strength can be expected; additional sand can be taken out; a further cutback in water is possible; and a lower total percentage of air gives effective protection.



When freshly placed, air-entrained concrete has a fatty, buttery appearance, is plastic and easy to work

Adjusting Mixes For Entrained Air

In present authorized compensatory steps, the matter of adjusting mixes to compensate for entrained air is a comparatively easy task. Simple, concise, easily understood material has been prepared by the A.C.I. (613-44); by Stanton Walker and Delmar Bloem on behalf of N.R.M.C.A.; by A. T. Goldbeck and J .E. Gray of N.C.S.A., and by the P.C.A., (Technical Bulletin T-12). Methods vary, but end results are approximately the same. Leading cement producers and manufacturers of air-entraining agents have recently issued pertinent pieces of literature.

The decision to include air entrainment in concrete, requires consideration of several principles in redesigning the mixes to compensate for the entrained air. As more air is entrained, it becomes progressively less efficient in reducing mixing water. The quantity of air entrained by a given percentage of admixture is reduced as cement content is increased. The effectiveness of an air-entraining agent in helping to produce high strength results is largely dependent on the water reduction it permits. For concretes containing larger top-size aggregate, the optimum air content is less than for concretes containing a small size aggregate, (1½-in. top-size 4 percent; ¾ in.—5½ percent; ⅜ in. —8 percent). On the rich mixes, to avoid sizeable strength reductions, air percentages should be maintained at the minimum required to give desired durability and workability.

The maintenance of comparable strengths is dependent on the amount of water that can be taken out. In concrete containing approximately 5 percent air, water may be reduced about one-half the volume of entrained air for a 4½-bag mix, one-third for a 5½-bag mix and one-fourth for a 6½-bag mix. Compressive strength reductions follow approximately this pattern: 20 percent on a 6½-bag concrete and 0-10 percent on 5½-bag concrete; an even break or a little better on 5-bag and a 5 percent increase on 4½-bag concrete. On the 6½-bag concrete, a reduced percentage of air could be used which, while giving effective protection, would substantially reduce the strength loss.

Air-entrainment bulks the concrete. If you put in 4 percent air, you have increased your cubic yard yield 1.08 cu. ft., substantially raised the slump and lowered the cement relationship. Changes have to be made in the weights to maintain the volume of the concrete, hold the same slump and, at least, keep a constant water-cement ratio. There are 7½ gal. of water in a cu. ft. If you are able to reduce the water content by 4 gal., you have compensated for the bulking by 0.53 cu. ft. The balance of .55 cu. ft. (generally) comes out of the sand—0.55 times the specific gravity of the sand times the weight of a cubic foot of water. If the specific gravity of the sand is 2.65, the formula is .55 x 2.65 x 62.4 lb., which gives 91 lb. of sand. In this case, cutting back on the water 4 gal. and 91 lb. on the sand compensates for the air.

In the A.C.I., **Standard Recommended Practice for the Design of Concrete Mixes (A.C.I. 613-44)**, several tables are used which require that you know the absorption of both your fine and coarse aggregates and the specific gravities of aggregates and cement. The A.C.I. committee suggests, in

adjusting mixes for air entrainment, that you: (1) reduce the percentage of sand 1 percent for each percent of air; (2) reduce the water 8.5 lb. per cu. yd. for each percent of air; and (3) maintain the cement constant. In following recommended A.C.I. practices, you will get substantially the same reductions on water and aggregate. Pamphlet (613-44) can be secured from The American Concrete Institute, Detroit, Mich.

Because of our close relations with Stanton Walker, who is engineering director of N.R.M.C.A., it is the conviction of many in the industry that mix proportioning techniques, advocated by him, should be recognized as official design procedures. Men who have attended the "Maryland Short Course" are well acquainted with those procedures. Others in the industry can have this concise information for the asking. It is lamentable that even some association members are failing to properly compensate for air entrainment.

In redesigning for entrainment of air, ready-mixed concrete producers will generally be on safe ground if they are taking a sand cut of 90 to 100 lb. and are cutting back 8 to 10 percent on water content.

As they become familiar with practices of adjusting mixes for air entrainment, ready-mixed concrete operators will find with lean concrete, while maintaining strength and workability at least comparable to plain concrete, and holding the water-cement ratio constant, a small reduction in cement may be taken. In rich mixes, when full compensation is made for air entrainment, it will be found that only minimum, unimportant reductions in strength develop.

Operating Problems

On the job, with fast mixed concrete, as much as 3 percent air can be lost in placing, vibrating and finishing. Fast-mixed, air-entrained concrete cannot be delivered successfully in non-agitating equipment. In fast-mixed concrete, a large percentage of the combined air is entrapped, not entrained; the bubble structure lacks stability. If contractors are experiencing trouble with concrete on minimum air requirements or pitting at the forms, mixing time should be increased and other steps taken to bring air contents within closer limits.

A most important purpose of vibration is the release of entrapped air. The presence of entrapped air is a principal cause of pitting at the forms. In entrapped air, the bubbles are bigger and not stable. In proper air entrainment, the bubbles are smaller and tougher. Controlled-entrainment of air will not increase the number and size of air bubbles on the formed surface of concrete except possibly where forms slope toward the concrete. In placing such concrete, slumps should be maintained at the minimum, consistent with good placing practices, and vibration should be continued until entrapped bubbles have had time to escape.

Careful controls are necessary if air contents are to be maintained within safe and reasonable limits. Regular checks should be made on the finished product with an air-determining device—of the pressure type, (e.g. Acme meter) for stone or gravel concrete; the volumetric type (rolling) for slag and other porous material. The rolling method unit can also be used efficiently with stone and gravel concrete. The quantities of materials must be adjusted to compensate for the air. Principally on the basis of fines in the 30 to 50 mesh screen classification, the approximate amount of air-entraining agent required for each regularly used mix should be determined. The air-entraining agent should be accurately added at the mixer by an automatic dispenser. The A.E.A. dispenser should be thoroughly maintained, regularly cleaned, (at least once a week), and checked daily.

Standard operating procedures should be adopted. In transit mixing, regardless of length of haul, mix no less than 70 revolutions of the drum. If you undermix or attempt a mixing speed-up, there will be a lack of control over slump and air content. You won't get the smaller, stronger, more stable air bubbles.

In central mixing, for each major mix, standardize on a set mixing time. Under no conditions order or allow a speed-up on your established mixing cycle. A pavement mix or any low-slump concrete requires a longer mixing time than does a more plastic concrete.

Increase the amount of the air-entraining agent in high temperatures when the sand becomes coarser and if the cement requires it. With one cement, we have varied the amount of the air-entraining agent from a low of ½ ounce to a high of 2½ ounces per sack of cement. What could we have done if we had been using an air-entraining cement?

If the concrete looks "stony," mix longer, add more sand and increase the amount of admixture. If the concrete looks like whipped cream, there is too much air; take out sand, cut back on mixing time and reduce the amount of the air entraining agent.

In the use of air entrainment, the richer the mix, the larger the possible reduction in compressive strength for a given air content. Accordingly, closer supervision of rich mixes is required than when low-cement-content concrete is required. Also, air-entraining agents become less efficient in entraining air as the richness of the mix is increased. This variation in admixture efficiency is a strong argument against the use of air-entraining cements where the quantity of the air-entraining agent is supposed to be fixed.

In rich mixes of air-entrained concrete, it is generally poor economy to add cement to get increased strength. In plain concrete, about 500 lb. per ½-sack of cement is gained. In rich air-entrained mixes, only about 200 lb. per ½ sack of cement is picked up. In rich mixes of air-entrained concrete, to get a 500 lb. increase, it is necessary to go from 5½ bags to 6¾ bags of cement. You can pick up about 700 lb. of increased strength by simply taking out a gallon of water to the sack of cement.

A similar problem involves the use of larger top-size aggregate which always reduces the mortar fraction of the concrete. In rich structural mixes, if high total air contents are required, there is no sense in using larger top-size aggregate, in an attempt to increase strengths. Concrete using the smaller aggregate will be more workable. In such mixes, ¾ in. top-size concrete develops approximately the same strengths as does concrete in which 1½-in. aggregate is used.

In such rich mixes, before raising the cement requirement or going to a larger top-size aggregate in attempting to get added strength, consider using less water, a lower sand content, a coarser gradation of fine aggregate, a reduced percentage of air and possibly an admixture which will enable you to get improved workability, with a lower water-cement ratio.

There are two other operating problems dealing with characteristics of air-entrained concrete which should be briefly discussed.

1. Sampling and testing procedures.
2. Possibility of reduced strength results with rich mixes in extremely hot weather.

Some testing engineers insist upon using air-entrained concrete, previously used in slump and weight tests, in preparation of strength test cylinders. This should never be done. Such thrice-used, air-entrained concrete will always produce inaccurate results with findings substantially below the

Notes—

(1) Cylinders made in cast iron molds or cast in tin cans frequently give 10 to 15 percent higher strength results than the "more economical to use" parafine-paper molds. In case your strengths are running slightly below requirements, you are entitled to have cylinders cast in steel cans. Tests taken from cylinders so prepared are apt to be more closely representative of the concrete in place.

(2) In making strength testing cylinders, even an unworkable concrete can be quickly consolidated; the batch is so small that it can be easily handled. How about such concrete in a structure? Is there any assurance that it is being similarly well handled? In the case of such concrete, does a high test report have any real meaning? Is the report reliable evidence that the concrete in place will satisfactorily perform its functions? It is easier to see the great advantages of air entrainment at the job rather than in the testing procedures. On the job, a lower slump, air-entrained concrete will prove just as placeable as a higher slump, plain concrete.

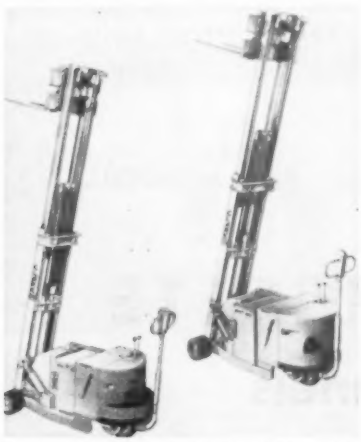
(3) In comparing field results with laboratory tests, we have regularly observed greater discrepancies with air-entrained concrete than has proved the case with plain concrete in: (a) estimated amounts of A.E.A. to produce a given percentage of air; (b) estimated strength results; and (c) cylinder tests compared with cores taken from the structure.

(Continued on page 208)

NEW MACHINERY

Telescopic Stacker

CLARK EQUIPMENT CO., Powrworker Dept., Buchanan, Mich., has added to its line of industrial trucks a telescopic tilting fork stacker in base



Two models of telescopic tilting fork stacker

capacities of 1500, 2000, 2500 and 3000 lb., rated a 24-in. center line of load. Two models are offered: one 83 in. high with 64 in. free lift and 130 in. maximum lift; and another designed for highway truck loading, 68 in. high, 49 in. free lift, and 100 in. maximum lift. Lifting speeds vary from 21 to 14 ft. per min. depending on load. The lightweight trucks are designed to provide maximum utility for operation in minimum aisles and over low capacity floors.

Block Cutter

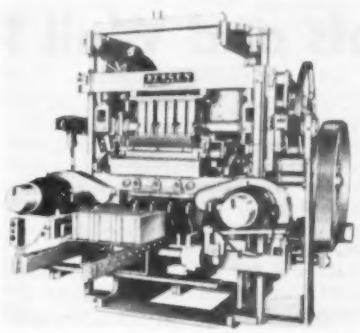
BESSER MANUFACTURING CO., Alpena, Mich., has introduced its block cutter available in an 18-in. and 24-in. model. Designed in automatic and semi-automatic operation, the machine

Hydraulic block cutter in operation

has hydraulic controlled power. Its features include automatic block placement under the cutting knife and adjustments for cutting various height block at 420 or 850 per hr. Longitudinal, diagonal and transverse cuts may be made on the same cutting table.

Concrete Block Machine

BERGEN MACHINE AND TOOL CO. INC., 189 Franklin Ave., Nutley, N. J. has entered the concrete block machine manufacturing field with its "Tri-Matic" block machine, designed for a rated production of 750 equivalent 8- x 8- x 16-in. units per hour. The cams and other machine parts are so designed that speeds may be increased by changing the size of the motor pulley to increase produc-



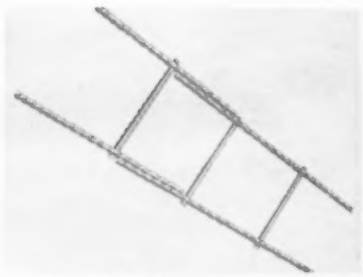
Mechanical concrete block producing unit

tion to as much as 900 8-in. units or more per hour. The "Tri-Matic," a mechanical rather than a hydraulic machine, uses plain pallets and produces three units at a time.

The block machine is to be manufactured at the company's new plant at Hackettstown, N. J., which provides approximately 130,000 sq. ft. of manufacturing space. Facilities at the new plant and other locations will be devoted to the manufacture of concrete block-making equipment and machinery, and parts.

Wire Masonry Reinforcing

ADRIAN PEERLESS, INC., 1481 E. Michigan St., Adrian, Mich., recently announced several improvements in its Wal-Lok masonry reinforcing mesh. Fabricated of 100,000 p.s.i. tensile strength cold-drawn steel wire, the mesh is now deformed, and knurled to 150 indentations per foot, to improve gripping and bonding qualities. The $\frac{3}{16}$-in. dia. longitudinal wires are said to represent the minimum amount of steel required in mesh to withstand stresses caused by shrinkage. No. 9 cross bars are deep welded and project beyond the longitudinal



Reinforcing mesh for masonry walls

wires to provide maximum anchorage. The masonry reinforcing mesh is available in 12-ft. lengths, in sizes for 4-, 6-, 8-, 10-, and 12-in. nominal wall thicknesses.

Fork Lift Trucks

AUTOMATIC TRANSPORTATION CO., 149 W. 87th St., Chicago 20, Ill., has developed the Skylift CF line of electric fork lift trucks. The series covers the 1000- to 4000-lb. load class and has a full telescopic height of 132 in. All models are offered with duolift rams, for full free lift, or with monolift rams, permitting 19¼-in. free lift before overall height begins to increase. A foot accelerator speed control prevents reversing the truck in other than the first of its four speeds which operate in both directions. The direction control level is located on the steering column; the brake is connected with the seat, providing automatic braking when the operator leaves the seat; and a dead man control automatically shuts off the current when accelerator pressure is relieved. Other features of the series are silicone insulated motors, hydraulic safety fuses, and interchangeable carriage and upright rollers mounted on sealed ball bearings.

High-tiering electric fork lift truck

Pouring vermiculite concrete in alternate panels for Commission Row, St. Louis, Mo. This job called for 130,000 lin. ft. of precast concrete joists and 326,000 sq. ft. of roof deck

Precon Concrete Products Co., St. Louis, Mo., is one of the largest manufacturers of vermiculite concrete products. It also has supplied large quantities of prestressed, precast concrete joists, columns, beams, and concrete balcony girders for schools, office buildings, hospitals and factories

By L. A. CASTELL

VERMICULITE CONCRETE
for Roofs and Wall Panels

ALTHOUGH ONLY SEVEN YEARS OLD, Precon Concrete Products Co., St. Louis, Mo., has grown so rapidly that it is now one of the major producers in the state, serving a radius of 500 miles in Missouri and Illinois.

One reason for this remarkable growth has been the firm's brisk promotion of vermiculite concrete for roof construction in conjunction with the precast concrete structural members of all types that it manufactures, including joists, beams, and columns. Another reason has been research into prestressed concrete, in which it is the pioneer of the area, directing its efforts toward precasting with prestressing methods, as well as prestress concrete poured in place.

Sidney Bierman, a registered structural engineer and a member of the American Concrete Institute, is president and general manager of the company, directing all operations. J. J. Kehoe is field superintendent. Precon works very closely with architects and contractors in development of plans, and much of this contact work is done by Raymond Hunter, sales manager, assisted by J. A. Mattus, sales engineer.

Precon has just been awarded the contract for all precast and prestressing work on the new Sumner High School in St. Louis. This job is one of the most outstanding prestressed concrete jobs in the country, having concrete balcony girders with a clear span of 90 ft.

The firm also furnished 130,000 lin. ft. of precast concrete joists required for Commission Row, the giant produce market just completed in St. Louis. The roof deck for this project, amounting to 326,000 sq. ft. of vermiculite concrete, was also installed by Precon. It has the distinction of supplying precast vermiculite concrete wall panels, the first of their kind, for the new 14-story Jefferson State Office Building in Jefferson City, Mo., and other recent jobs include roof decks for numerous schools and hospitals and for the factories of such well-known firms as Mallinckrodt Chemical, Joy Manufacturing Co., and Tums.

"Our most potent argument to sell a job is price," commented Mr. Bierman. "If you can offer price, insulation, fireproofing, and permanency all in one package, you have an attractive deal. But, mainly, we've gotten this business because we're able to furnish a superior type of roof system that's very competitive.

"It's more or less open bidding on roof jobs. There's a set of plans, but the roof system will be an open specification, requiring certain conditions of insulation, strength, and appearance. After those conditions are met, it's a matter of price."

Precon uses no ready-mixed concrete on its roof jobs. The vermiculite concrete is mixed at the job site. Daily production is very high: areas as large as 20,000 sq. ft. have been placed in a single day.

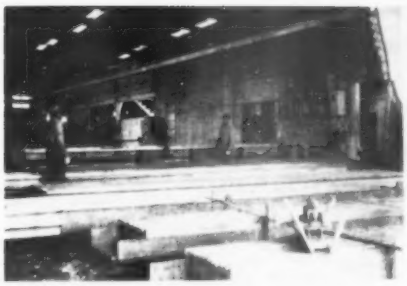
Construction Methods

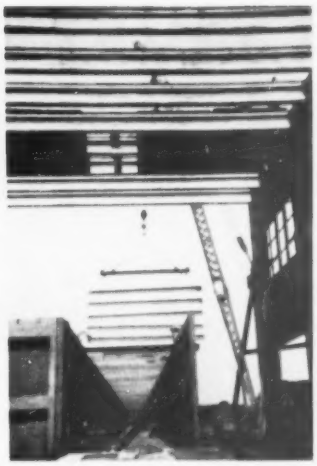
On Commission Row, where speed was essential, a mobile 2-cu. yd. mixer turned out a yard of concrete every three minutes. This was a 1:4 mix (one part portland cement to four parts vermiculite aggregate). A man on one side of the mixer dumped in the cement after the water had been run in, and a man on the opposite side dumped in the aggregate. A 1-cu. yd. Towermobile bucket took the mix to the roof and discharged it into a 1½-cu. yd. hopper with a bottom opening. From there it was unloaded into 5-cu. ft. buggies, wheeled to the pouring site, and placed in alternate panels about 12 ft. wide over 6 x 6 x 10:10 gauge reinforcing mesh, down the length of the building.

The following day, the strips that had been omitted were filled in. An aluminum channel drag-off was used for screeding. Screeds had been previously put down over the roof area.

This unusual alternate pouring procedure was developed because the 3-in. thick slab was placed over ¼-in. cement asbestos board, which served as the form and makes an attractive finished ceiling below. The thin, unanchored board was tricky to work on, but placing the concrete in alternate strips solved the breakage problem and made it easier for the workmen to find a place to walk. Runways of ¾-in. plywood, spanning the joists, were used. The light weight of this concrete was a considerable advantage, since twice as big a load (compared with sand concrete) could be buggied safely.

Precon's average crew for the full roof operation was only 18 men, including those charging and operating the mixer and unloading material from the truck as it was needed. Dry material was delivered by the firm's huge transport, as many as 565 bags of aggregate at a time. None of it was stockpiled, since it would later be too far away from the mixer, which, with the Towermobile, was moved to a new location every four days.





Above, left: Interior view of plant where precast concrete joists are made. Center: Placing precast concrete joists in Commission Row building. From five to seven joists are picked up and set in place at a time. Above, right: A Towermobile lifts vermiculite concrete to roof deck. Left, below: Placing a 4- x 5-ft. vermiculite spandrel wall panel. Right, below: A chain hoist assists in placing panel into position

Commission Row consists of two buildings, each 114 ft. wide, 1225 ft. long, and 22 ft. high, facing each other across a central paved truckway 120 ft. wide. The job is a construction landmark, not only for size, but because of the heavy design of the tilt-up walls. Some of the panels were designed to carry warehouse loads of 150 lb. per sq. ft., in addition to the roof construction. More than three miles of panels, 10 in. to 12 in. thick, were tilted, some weighing 32 tons each. Robinson Construction Co. of St. Louis was general contractor.

Precast Joists

Supporting the roof deck and the balconies are Precon's precast concrete joists. These consist of a modified I-beam section, using a truss-type steel assembly in which the joists act as independent beams. All joists have a clear span of 24 ft. and are spaced on 32-in. centers lengthwise within the building and horizontally over the concourse that serves as a truck dock and trading area for merchants.

Besides precast columns, beams, and girders, Precon also manufactures precast panel-type roof slabs of vermiculite concrete in a standard size of 18- x 36-in. and 3 in. thick.

Long experience in handling lightweight concrete brought Precon the order for 18,000 sq. ft. of precast wall panels for the Jefferson State Office Building. These were cast at the rate of 1000 sq. ft. a day directly into 12-gauge, U-shaped steel frames, furnished by the fabricator, which acted as the forms. Sizes varied, but the typical panel was 4 x 5 ft., 3 in. thick, weighing about 10 lb. per sq. ft. The mix was 1:6 (one part portland cement to six parts vermiculite aggregate). Reinforcing consisted of 6 x 6 x 10:10-wire mesh embedded in the center of each panel.

Precon placed the steel frames, which are a permanent part of the panel, on sections of plywood, filled them, and stacked them flat the following day so that minimum space was tied up. The panels cured for 28 days and were then trucked to Jefferson City, 125 miles away. There they were bolted into place by MacDonald Construction Co. of St. Louis, the general contractor. There was virtually no breakage, either in delivery or erection.

Mr. Bierman predicts wide use of this type of wall panel in buildings of the future.

"Such construction has very definite advantages," he commented. "No forming is needed, and the panels can be erected very quickly. At Jefferson City two men placed a panel covering 20 sq. ft. in a matter of 20 min. They were able to work directly from the floor level at which the panels occurred, which eliminated the need for scaffolding and considerable field labor."

There is also a bright future for prestressed concrete, Mr. Bierman says.

"Conventional reinforced concrete systems are more or less limited because of the weight and size of the members required," he asserted. "With prestressing, we can secure much greater spans and there's a saving of about 75 percent in steel requirements."

A READY-MIXED CONCRETE PLANT has been opened at Mt. Vernon, Iowa, by Dale Larson and Sidney Schweitzer.

Six concrete-mixer truck drivers for Dravo Corp., Keystone Div., Pittsburgh, Penn., were recently presented special safety awards for completion of 500,000 miles of safe driving. L. P. Struble, general manager, left, presents awards to, left to right: Wayne Noss, Edwin Frair, Charles Paris, John Hess, Joseph Curc, Jr., and Paul Papera

HIGH-PRESSURE CURING

Foamed concretes, effect of silica flour, sand-lime developments, control joints and research progress discussed at the annual meeting of the Autoclave Building Products Association

OVER 50 MEMBERS and guests attended the 47th annual convention of the Autoclave Building Products Association held in Richmond, Va., March 1-3, 1953, marking a new high both in attendance and in quality of technical papers since the days of the old Sand-Lime-Brick Association. On the lighter side, informal trips to famed Williamsburgh, a tour of historic points in Richmond for the ladies, a visit to the Liggett & Myers plant and the usual informal get-acquainted gatherings rounded out the program.

As a result of elections, Elmer R. Coates, vice-president of Mutual Materials Co., Seattle, Wash., turned over the presidency of the A.B.P.A. to Dale Cobb, sales manager of Century Brick of Monroe, La., while Leo J. Ryan, president of Ryan Builders Supply, Ltd., Windsor, Ontario, Canada, remained on as the vice-president. Henry DeGeus III, manager, Saginaw Brick Co., Saginaw, Mich., was made secretary. Elmer Coates, retiring president, took the chairmanship of the Sand Lime Products Section, and Ralph E. Cromis, manager of Boice Builders Supply, Pontiac, Mich., the chairmanship of the Concrete Products Section.

The Monday morning session began with an introduction of members and guests, and the appointment of committees. Jack Lacy, partner, Concrete Building Units Co., Richmond, then extended a formal welcome from the historic host city and traced its development from earliest colonial times.

Foamed Concretes

Rudolph C. Valore, Building Technology Division, National Bureau of Standards, followed with the first technical paper on "Lightweight Building Products" after referring to the previous discussion of foamed concretes by Dr. Dilnot of Great Britain at the 1952 Convention of the same group. According to Mr. Valore, cellular or foamed products may range in density from 10 p.c.f. for an insulation material with very little strength up to 40 or 50 p.c.f. or higher for structural grades. When made with cement only and cured at room temperatures, strengths are low, shrinkage is high and cracking is likely to occur. Such cementitious foams may be used for pouring into trenches to embed and insulate pipes but are not particularly satisfactory for manufactured insulating or structural products. However, when cement or lime is mixed with siliceous materials like silica flour, fly ash, glass grinding waste or the fines from certain volcanic or kiln fired aggregates, and then cured in high pressure steam (80-150 p.s.i.) for a few hours, strengths may be increased two to four times and shrinkage greatly reduced by the formation of a crystalline product.

Autoclaved cellular materials are widely used in Sweden under the name of "Siporex" (portland cement and pulverized sand), "Ytong" (hydraulic lime and siliceous materials) and in Great Britain and the Continent as well. Many of these are now being introduced in this country. These products differ not only in raw materials but in methods for producing the cellular structure. Thus aluminum powder reacts with cement or lime to generate hydrogen bubbles, while hydrogen peroxide may be used to form oxygen bubbles. Least expensive material for foam formation, Mr. Valore has found, are the waste protein foaming agents developed for fire fighting. These may be pre-foamed with air, or mixed with the cementitious slurries in an ordinary paddle mixer arranged so the speed can be tripled to whip in air. Such foamed slurries are very stable and more predictable than chemically produced gas foams.

Typical physical properties given by Valore and by others in the lively discussion which followed his talk were:

		Compressive Strength	
Density	K Factor	Moist Cured	Autoclaved
10 p.c.f.	.5		
20	.65		
30	.8	100	
40	1.0 to 1.1	300-400	800-1200
43	1.13		1300

Typical of the material economy was the fact that a 700 p.s.i. flyash product weighing only 35 p.c.f. could be made with only three sacks of cement per cubic yard.

Elmer R. Coates of Seattle told, in the discussion period, of the work he and Dr. Dilnot of Jackson and Church, are doing on a similar product for which they expect to issue franchises soon.

Following Mr. Valore's talk, James B. Frysinger of the Pennsylvania Glass Sand Corp., Pittsburgh, gave an illustrated lecture on the mining of quartzite and the milling of silica flour at the company's new Berkley Springs, W. Va., plant. In the discussion following, the importance of silica flour for autoclaving was emphasized. Harry E. Easterly of Richmond, said that his company ordered silica with 95 percent passing 200 mesh and that this gave a surface area of 950 sq. cm. per gram.

Shifting momentarily from the autoclaving theme, Dave Wisdom, Krete Koater Service, Hillsboro, Ill., illustrated with slides his subject of "Coating of Concrete Masonry Units" in which he described equipment and process for a new sprayed-on plastic color coating for block.

Sand-Lime Products

Finally, concluding the morning session, H. D. Robertson, president of the Harbour Brick Co., Ltd., Toronto, Canada gave some interesting details on his "Production of Sand-Lime Brick and Sand-Lime Block." Grading of the sand, an all important factor in quality, is facilitated by the natural tendency of Lake Ontario to classify the sand it deposits. A 2000-ton boat picks up torpedo sand at the top of the lake and fine sand farther down the lake, the finest size being carried the farthest. The fine sand is 50-65 percent silica.

Lime and sand, continuously proportioned by belt feeders, are mixed fairly dry, ground for 10 min. in a rod mill, and then used for both sand-lime brick and block. Sand-lime block are made with radius corners and as wet as possible without causing blistering. A tamper machine is used since ordinary vibration fails to compact the mix.

The sand-lime block with 38 percent core space and weighing 50 lb. for the full 8- x 8- x 16-in. unit, test 1400 p.s.i. with eight tamper blows, show an absorption of 10 to 11 percent and, as far as Mr. Robertson has observed, have given an excellent record for weather exposure and freedom from cracking in the last 24 years. Strengths could be increased by addition of silica flour or by longer tamping.

In the afternoon session, G. S. Maynard, district engineer for the P.C.A. in Richmond, led off with a talk on "Advertising and Sales Promotion," and a discussion of the various services the P.C.A. offers the block producer. He suggested that now was the time to plan what to do when once again it becomes a buyer's market. A number of questions were then raised on the official attitude of the P.C.A. toward autoclave curing.

Following a discussion of control joints and cracking in walls, and an unscheduled talk on self-unloading block trucks, John K. Selden, coordin-

ator of housing research, at the Research Foundation of the University of Toledo concluded the afternoon session. His informal remarks were directed toward the recent growth of interest in autoclaving and the advisability of a coordinated research program to include projects of the Autoclave Building Products Association, the currently active A.C.I. Committee 716 on High Pressure Steam Curing, headed by Dr. Hansen of Universal Atlas, and the soon to be organized special N.C.M.A. comittee for financing of studies on autoclaving product, process and plant design. The keen interest in autoclaving shown at the Concrete Industries Exposition and N.C.M.A. Convention in Cleveland in January served to emphasize the timeliness of such a move.

The session was then adjourned early to give the paid membership a chance to call a special closed meeting on research.

Tuesday morning, after a brief discussion of possible approaches to interesting new producers of autoclaved products in taking out membership in the Autoclave Building Products Association, J. K. Selden gave his postponed "Report on Toledo University Investigations."

Outlining briefly some of the investigations which had been undertaken in Toledo, he said the largest projects were those sponsored by the Housing and Home Finance Agency and the Office of Chief of Engineers, Department of the Army. Included were studies of volume change characteristics and other physical properties of bars cut from blocks, full sized block and walls, and also cracking characteristics of small walls restrained from shrinkage by steel struts. Preparation for and completion of the government projects were made possible by generous support from individual autoclave producers, the Toledo area products plants, two trade associations, the Besser Manufacturing Co., and Gene Olsen Corp. Additional project sponsors included the National Lime Association, Toledo Edison and Adrian Peerless.

Among the more significant findings reviewed by Mr. Selden were the following:

1. Two-day autoclave strengths approximated 28-day moist cured strengths with most aggregates.
2. Replacement of part of the cement with siliceous fines, such as flyash or siliceous flour, improved autoclaved strengths, particularly with expanded slag, perlite and some other aggregate.
3. Lime, when used to replace 25 percent of the cement, and lime plus flyash used to replace 67 percent in autoclaved expanded slag products gave no substantial change in strength.
4. Bars cut from block gave fairly good correlation with full block in shrinkage studies. They were much easier specimens to work with.
5. Of the five curing methods used, only the high pressure steam showed substantial reduction in shrinkage. None of the atmospheric pressure curing methods were particularly effective in reducing shrinkage. Autoclaving generally reduced shrinkage approximately 50 percent.
6. Drying of most concrete units down to 40 percent moisture content was relatively ineffective in reducing shrinkage since most of the shrinkage occurs in removing the last 40 percent of moisture.
7. All walls of high temperature cured units laid wet, cracked when dried to equilibrium with 25 percent R.H. (relative humidity) under restrained conditions, but none of the walls of autoclaved units laid air dry at 70 percent R.H. cracked. Neither wet autoclaved nor dry, high-temperature cured units were as free from cracking as the dry autoclaved blocks.
8. The new deformed and welded wire reinforcement when placed in every mortar joint of restrained walls of high-temperature cured block laid wet was extremely effective in reducing crack width to about one-sixth of that in non-reinforced walls. Ordinary reinforcing practice is relatively ineffective in crack reduction.

Elmer Coates, retiring president of Autoclave Building Products Association

Mr. Selden indicated that printed copies of the first Toledo report could be obtained about April 1 by writing to the Division of Housing Research, Housing and Home Finance Agency, Washington, D.C.

"Chemistry of Autoclave Building Products" was the title of a report on basic research on the hydrothermal synthesis of calcium and alumino silicates by R. B. Peppler, chemist at the National Bureau of Standards. Speakers at previous conventions having covered the system lime-silica-water, he concentrated on recent studies with alumina. In the discussion that followed, Mr. Peppler indicated that there was no evidence to date that steam pressures above 150 p.s.i. would be of any significant benefit in alumino-silicate formation, but he did not discuss the effect on calcium silicate synthesis.

John Selden of Toledo then outlined briefly his suggestions for "Needed Research on Autoclave Curing," such as: effect of various percentages of cement, lime, flyash and silica flour and of variations in curing cycle and pressure on physical properties of the autoclaved product; effect of several cycles of wetting and drying on shrinkage; possible advantages of two-step curing with intermediate stripping and cubing; elimination of corrosion by Leo Ryan's method of introducing a few drops of oil in the steam line.

For those interested in building autoclave plants, Mr. Selden suggested that studies should also be made of the most efficient autoclave and door design, automatic handling equipment, maximum use of cylinder space, fuel economy, over-all plant design, possible economies of group purchase and methods of financing.

After lunch, Harry W. Easterly, Jr., executive vice-president, Concrete Pipe and Products Co., Inc. of Richmond presented a "Report on Work of A.C.I. Committee 716." Cooperation of four autoclave products plants with four laboratories—those of the Bureau of Standards, Bureau of Reclamation, P.C.A. and Research Foundation of the University of Toledo—in measuring shrinkage of autoclaved blocks by various methods was outlined. The subject of specifications for autoclaved products was then discussed by the group. It was also decided to call a meeting in Chicago in the near future for all those interested in autoclaving research.

The convention concluded with an extremely interesting tour of one of Mr. Easterly's plants in the late afternoon and several informal business and social gatherings in the evening.

Concrete Products Plant

THE MARIETTA CONCRETE CORP., Marietta, Ohio, recently announced plans to build a new plant at Hollywood, Fla., for the production of concrete block, precast wall panels, farm and industrial silos and other concrete products. Cost of the plant will be about $250,000. The plant will be operated under the name of The Marietta Concrete Corp. of Florida. F. L. Christy, president of the parent Marietta firm, will also head the Florida corporation. When completed, the plant will call for the employment of about 200 people.

READY-MIX CONCRETE CO., York, Neb., formerly owned by Harry Vanier, has been purchased by Herbert K. Burnham, who is associated with the York Gravel Co. Mr. Burnham will be in charge of the ready-mixed concrete operations, while Rich McKenzie will operate the gravel plant.

Western Concrete Pipe Meeting

THE WESTERN CONCRETE PIPE ASSOCIATION held its 34th annual convention, March 25-27, 1953, at the Hotel Californian, Fresno, Calif., with a representative group of producers from all parts of the West attending.

The convention was opened with a meeting of the board of directors which authorized the purchase of additional testing equipment for use by the field engineer. Also authorized were "reasonably extensive" tests on non-reinforced sewer pipe, comparing the suggested "permeability" (fill) test in the tentative revision of C14-52 and the present hydrostatic test therein on both steam-cured and 7-day water-cured pipe.

It was reported that twenty new active and 13 new associate members were obtained in 1952 and, up to the time of the meeting, five new active and three new associate members had joined the association in 1953.

At the opening session of the general membership meeting, H. W. Chutter, president, reported on the 45th annual convention of the American Concrete Pipe Association, held at Dallas, Texas, February 26-28, 1953. The session also included a report by Ephraim Dyer, Jr., field engineer, on his association activities of the past year; the financial report; a discussion of proposed specification changes; and the election of officers and directors. H. W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif., was re-elected president. Also re-elected were Fred N. Linn, United Concrete Pipe Corp., Modesto, Calif., vice-president; and William S. Rogers, Rogers Materials Co., Madera, Calif., secretary-treasurer. Four members of the board of directors, elected for 3-year terms, were William S. Rogers; Homer Marx, Medford, Ore.; O. M. Hooper, Hooper Concrete Pipe Co., Phoenix, Ariz.; and W. R. White, W. R. White Co., Ogden, Utah.

Other sessions featured a number of reports and speakers. Howard F. Peckworth, managing director, American Concrete Pipe Association, reported on various topics of interest to the industry. He commented on the increase in volume of the concrete pipe business and expressed his belief that 1953 promised an even greater volume of business. He cautioned, however, that members should prepare themselves for a possible slump in the business. He also discussed many matters of technical interest to the industry.

C. G. Knoll of the California Association of Employers, discussed labor-management problems facing the industry, and possible changes in the Taft-Hartley Act. Homer W. Jorgensen, consulting civil and sanitary engineer, Modesto, Calif., reported on the use of concrete pipe in sanitary sewers, and Ernest C. Fortier, engineer, U.S. Bureau of Reclamation, San Joaquin Valley (Calif.) district, spoke on the subject, "Pioneering Experiences with Concrete Pipe Distribution Systems of Unprecedented Size."

Other features of the convention were: a movie on irrigation, entitled, "Thirsty Acres," presented through the courtesy of Union Pacific Railroad Co.; a panel discussion, headed by H. A. Weigand, United Concrete Pipe Corp., Baldwin Park, Calif., Carl B. Warren, Spokane Concrete Pipe Co., Spokane, Wash., O. M. Hooper, Hooper Concrete Pipe Co., Phoenix, Ariz., G. D. Williamson, Valley Concrete Pipe & Products Co., Yuba City, Calif., and Charles E. Ward, Utah Concrete Pipe Co., Ogden, Utah, who led discussions on such subjects as "Expansion Joints for Concrete Pipe," "The Effect of Changes of Water Temperature," and many other topics of general interest; and the annual cocktail reception and dinner, which was attended by approximately 150 members and guests.

The members voted to hold the fall meeting at Portland, Ore., during the early part of October, and the 1954 annual meeting at Fresno, Calif., in early February.

Registrations

Producers:

Harold E. Baker, Peerless Concrete Pipe Co., Yuma, Ariz.
G. N. Black, Fresno Concrete Pipe Co., Fresno, Calif.
Jess Blaker, Turlock Concrete Pipe Co., Turlock, Calif.
Earl L. Church, Fresno Concrete Pipe Co., Fresno, Calif.
H. W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif.
J. E. Cooper, Coopers Concrete Pipe Co., Bakersfield, Calif.
M. W. Crouch, Peerless Concrete Pipe Corp., Santa Ana, Calif.
Jerry Eby, Elk River Concrete Products Co., Great Falls, Mont.
M. B. Fowler, Fowler & Myers, King City, Calif.
Harrell Gannaway, Six Points Lumber Co., Phoenix, Ariz.
M. C. Gibson, Gibson's Concrete Pipe, Delano, Calif.
J. P. Gilbert, Gibson's Concrete Pipe, Delano, Calif.
H. O. Hilfiker, Hilfiker Concrete Pipe Co., Eureka, Calif.
O. M. Hooper, Hooper Concrete Pipe Co., Phoenix, Ariz.
Ward W. Hughes, Concrete Conduit Co., Lindsay, Calif.
William W. Hurst, Hurst Concrete Products, Santa Barbara, Calif.
G. R. Jessen, Idaho Concrete Pipe Co., Nampa, Idaho
R. F. Kretz, Concrete Pipe & Construction Co., Gilroy, Calif.
John Kristich, Kristich Brothers, Watsonville, Calif.
Walter J. Lenz, S. Lenz & Son, St. Helena, Calif.
Fred N. Linn, United Concrete Pipe Corp., Modesto, Calif.
F. Mangine, Visalia Concrete Pipe Co., Visalia, Calif.
Floyd L. Martin, Portland Concrete Pipe & Products Co., Portland, Ore.
P. M. Matich, San Jose Concrete Pipe Co., San Jose, Calif.
C. R. Mosher, Tellyer Concrete Pipe Co., Albuquerque, N.M.
Cecil V. Mumbert, Mumbert Concrete Pipe Co., Lodi, Calif.
Cal Peyton, Peyton & Co., Klamath Falls, Ore.
Fran Porter, Lindsay Cement Products, Lindsay, Calif.
Jack O. Powell, San Joaquin Valley Pipe & Construction Co., Chowchilla, Calif.
O. H. Price, Healdsburg Concrete Pipe Co., Healdsburg, Calif.
Nick Puglizevich, Eli & Nick's Concrete Pipe Co., Merced, Calif.
R. R. Reynolds, Van Cleve Construction Co., Exeter, Calif.

(Continued on page 209)

Part of the group attending the 34th annual convention of the Western Concrete Pipe Association

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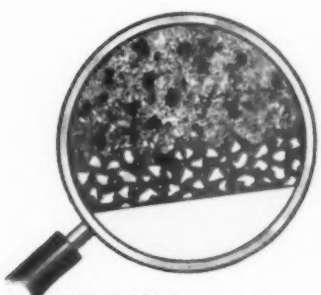

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YOUR customers will likewise acclaim the cost saving versatility of block that permits them to erect *in a single masonry operation loadbearing walls, completely finished on both sides, one color inside and another color outside.*

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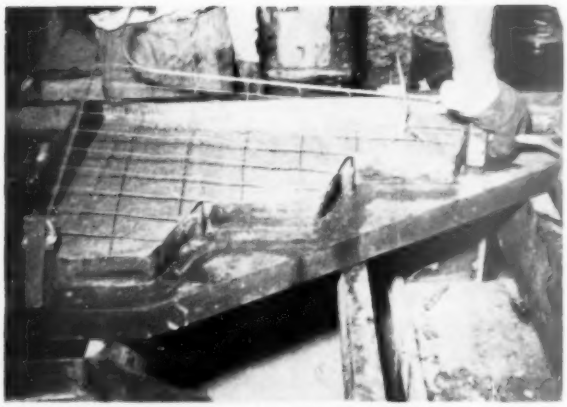


Left: Template table for making reinforcement mats. Right: Placing reinforcing preparatory to application of vibration

Successful Precast Step Business

Homeward Step Co., Cuyahoga Falls, Ohio builds up good business specializing in concrete steps and porches

By LOWELL ROBERTS

THE STORY OF THE HOMEWARD STEP CO. in Cuyahoga Falls, Ohio is proof that a small concrete products plant can succeed in the manufacture of a new product and market it in a relatively short time. About two years ago R. M. Hamilton was seeking a small business venture to occupy his farm property in this suburb of Akron, Ohio. He decided to buy a franchise for precast concrete steps as he felt that a good potential market existed for this new type product in the area around Akron. A company was formed with Mr. Hamilton as manager, and a franchise for a five-county area was secured. The first steps and porches were produced and installed in the fall of 1950. Since then a steady volume of the products manufactured has been maintained throughout the building season.

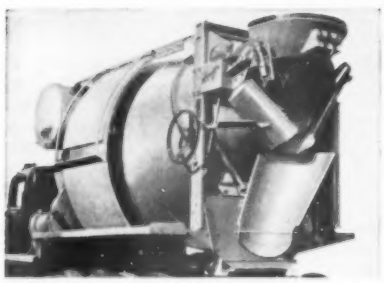
Step sets up to 8 ft. high and from 4 to 12 ft. wide and steps with porches attached of the same heights and with porches up to 6 x 8 ft. are made by this plant. Both porches and steps are made for either side or front installations. About 50 sizes are standard stock items, and combinations of about 150 sizes are available from the molds in the plant. Standard sized iron rails are stocked and special sizes are available on short notice.

Reinforcing steel, mesh and cement are stocked on the upper level of the building and lowered to the work floor by chutes. Sand and stone are handled by gravity to the mixer on the lower floor. All of the molds are handled on special tables of proper working height that were designed for this purpose. The machinery consists of a 12-cu. ft. paddle mixer powered by a 5-hp. electric motor, a 2-hp. compressor with 150-lb. air pressure to operate the two pneumatic hammers for vibration and a template table to form the reinforcing mats. The reinforcement is ¼-in. rod and 2- x 2-in. galvanized mesh, 16 gauge. High-early-strength cement, No. 9 white limestone and clean washed concrete sand are used for all products. This combination with proper vibration produces a light-colored, smooth-finished concrete that tests over 6000 p.s.i. in 28 days. The forms are cleaned with oil and filled each day. Curing in hot weather is done by means of a large lawn sprinkler which wets down the green products in the storage yard. The various sizes are stocked together for easy identification and loading. Dating of each day's run insures proper curing before shipment. Three part-time employes working on a 5-hr. shift each day produce about five sets of steps and porches each day in the season.

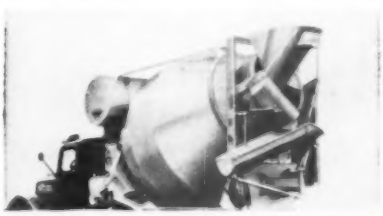
Dealers in the five-county area handle about 75 percent of the output. The remaining 25 percent is sold direct and installed locally to users and contractors who require installation. The sectional products permit users to install the jobs without the use of special equipment or trained men. An attractive discount plan permits dealers to pick up steps as sold thus eliminating the problem of stocking and double handling. Attractive price lists, folders and instruction sheets are provided to help dealers in their sales. It has developed that steps on display are the best salesmen and display sets attract many inquiries.

An attractive precast, reinforced concrete porch

Get greater payload capacity with Worthington Hi-Ups



MODEL LC—standard equipment: top hatch loading door, closed end charging door, running boards, side shields. Approximate weight—7100 lbs.



MODEL LO—standard equipment: open end drum with fixed hopper, inspection plate, no side shields or running boards. Approximate weight—6300 lbs.

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R-3-1

If It's A Construction Job, It's A *Blue Brute* Job

WORTHINGTON
Construction Equipment

CUTTING COST
of High Pressure Curing

By WM. J. SHORE*

THERE ARE IN OPERATION in the United States and Canada a total of approximately 14 high-pressure drum curing systems; roughly constituting 0.5 percent of the entire block plants in operation.

Two factors are mainly responsible for this small number of high pressure plants: (1) the huge investment demanded, ranging from $150,000 to $250,000 (amounts of capital not generally available to block plants); and (2) the undue high cost of licensed boiler attendants, involving approximately $15,000 per year for non-productive labor.

Despite all this, there are compelling reasons for the installation of high-pressure steam curing systems and they may be summed up briefly:

(a) Where, due to local conditions, block manufacturers are not able to make block free of breakage and cracking, it is necessary to convert to high-pressure merely to survive and stay in business.

(b) High-pressure cured block are conceded to be finest quality block. Their volume change is but 50 percent of ordinary block. Their moisture content is so low, that they never shrink; on the contrary, they usually expand and consequently breakage is cut to minimum (because blocks can take almost any amount of compression, but they cannot take tension.)

(c) With high-pressure curing, it is possible to increase block production per bag of cement by nearly 50 percent (based on record of a southwestern high-pressure plant).

The cost of cement is a substantial cost item and any reduction in the use of cement is important.

(d) Federal, state and municipal architects and engineers favor high-pressure cured block. Often, specifications allow only high-pressure cured block.

(e) Wherever a new high-pressure curing system is installed, block quality in that area improves. Block producers, selling inferior cured block, begin to find the going rough and trying.

All of the above facts are well known to the block industry, and as noted before, high initial cost and high maintenance labor costs have been responsible for the fact that in the entire United States and Canada there are but 14 such plants.

Value of a New Approach

During the past six months, the author was actively engaged in the preparation of plans and specifications for the installation of a new high-pressure steam curing system with a daily production of 30,000 blocks. The close study of various aspects of this type of steam curing showed its undoubted benefits. It also brought to the forefront, the very substantial sum of money required to make such a conversion. And it also brought up the question, "Is it possible to design a high-pressure steam curing system that can be bought by any block plant making over 7,000 block per day?" In consequence of this, a more searching study was made by the author to seek a solution, and to develop a high-pressure curing system for the average plant. The result of these studies resulted in the design of a new type of high-pressure drum-curing plant. Actually the change required was nothing startling in its implications, the change was not at all radical, in fact, one might say it was simplicity itself.

Low-Cost High Pressure Systems

The author recommends these changes:

(a) Each steam curing drum has its own steam generating equipment sufficient in size.

(b) Steam-generating equipment to be one unit or a multiple assembly of specially designed generators with such small heating surfaces that they do not conflict with rules and regulations that require licensed attendants.

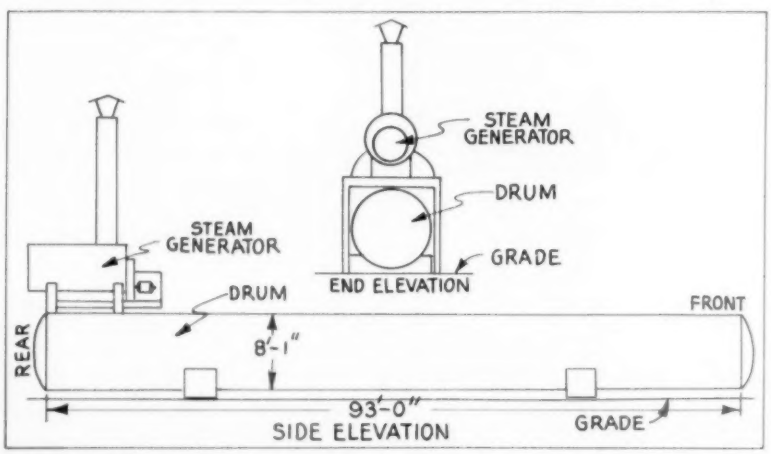
With this particular combination it becomes possible for a block plant to install one, two or three drums at separate intervals. It is no longer necessary to make a complete and entire changeover. In fact, a block plant that now makes 3,000,000 block per year might install one drum with a daily production of 4,000 block per day or 1,000,000 a year, and thus can cure with high temperature 2,000,000 block, and with high pressure 1,000,000 block. All this with no change or disturbance of any kind. At times it might be an advantage to deliver two types of block, standard and super-fine standard. Such an installation can successfully meet competition from any type of local high-pressure curing system selling only high pressure cured block. No licensed attendants are required and the drum can operate two shifts with no difficulty. At the end of one year, additional revenue gained through price premium and lower cement costs, provides sufficient funds to proceed with the installation of the second high pressure drum and so forth until the entire plant is converted to high pressure.

Cost of System

In order that the reader may have a clearer idea of what the cost might be for this new type of high-pressure curing, the author presents some figures recently received for the installation of a high-pressure, steam curing system. It must be understood that the figures quoted are subject to variation 5 percent plus or minus; that is, because prices vary widely all over the U.S.A. because of different labor costs.

The cost of steel drum with bolted door (holding 2000 8-in. units) and high-pressure steam generator or generators sufficient to steam-cure 2000 block in 12 hours is $22,000. The

(Continued on page 206)



Side and end elevation of combination steel curing drum and steam generator for self-contained, high-pressure, steam-curing system

*Shore Engineering

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Today, everyone is keenly aware of cost.
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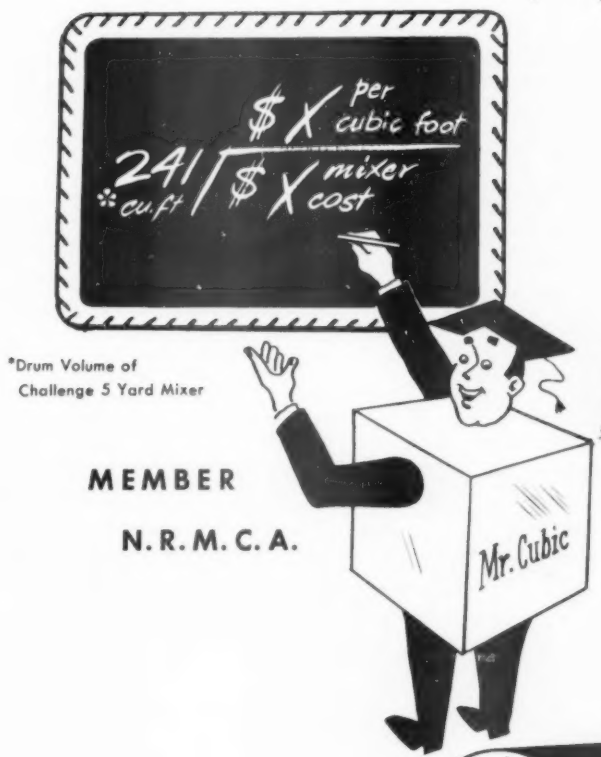
However, with truck mixers, the WAY cost is figured is extremely important.

cost per cubic foot of drum space

Here is the only true "unit of measure" in analyzing the dollar value and initial cost of a truck mixer. After all, in accordance with TMMB* specifications, the total drum volume is the prime factor in determining the rated payload capacity of the mixer. Divide the price quoted on any mixer by the number of cubic feet in the drum. You will readily see that, size for size, Challenge Mixers give you MORE *mixer* with MORE *earning power* for your equipment dollar.

*Truck Mixer Manufacturers Bureau.

Take a "second look" at the rated capacity on the mixer you buy and determine the "cubics" in the drum . . . *it's the cost per cubic foot that counts!*



*Drum Volume of Challenge 5 Yard Mixer

MEMBER
N.R.M.C.A.

CHALLENGE TRUCK MIXERS

Are Made In 3 • 3½ • 4 • 5 • 6 • 6½ Cubic Yard Sizes

Standard of the Industry...

COOK BROS. EQUIPMENT COMPANY
3334 San Fernando Road, CLeveland 6-3151
Los Angeles 65, California

Exclusive National Distributor For CHALLENGE TRUCK MIXERS — *Standard of The Industry*

Cut Curing Costs

(Continued from page 204)

cost of the complete installation of the entire equipment, including freight and delivery of drum, door and generator, rigging and mounting same in place, insulation of drum, all steam piping and connections, exhaust cooling system, engineering, plans and supervision would be $11,000, or a complete cost of $33,000. Equipment and installation costs may also be obtained on deferred payment terms.

Potential Added Revenue

The drum which holds 2000 blocks can steam-cure 4000 per day or 1,000,000 per year.

†Premium for quality block @ 1¢ per block	$10,000
Lower cement content equiv. 1.3¢ per block (based on 38 blocks per bag cement)	13,000
Estimated total additional revenue per year	$23,000

†(Premiums received per block vary widely.)

Summary and Conclusions

Development of this new high-pressure drum-curing system makes it possible for almost all block plants to make the installation of such a system.

History clearly shows, that any new method, or process, or equipment that permits the manufacture of a finer quality product, at equal or lower cost, that method, process or equipment ultimately prevails and becomes standard practice in the industry.

The author firmly believes that it will not require too long a time for high-pressure, steam-drum curing to become the standard and accepted method for curing block in the concrete block industry.

Texas Masonry Meeting

THE TEXAS CONCRETE MASONRY ASSOCIATION held its annual spring meeting May 1-2, 1953, at Corpus Christi, Texas, at which Texcrete Co., Corpus Christi, was host. Delegates were conducted on a tour of the Texcrete plant, following the final business sessions on May 2.

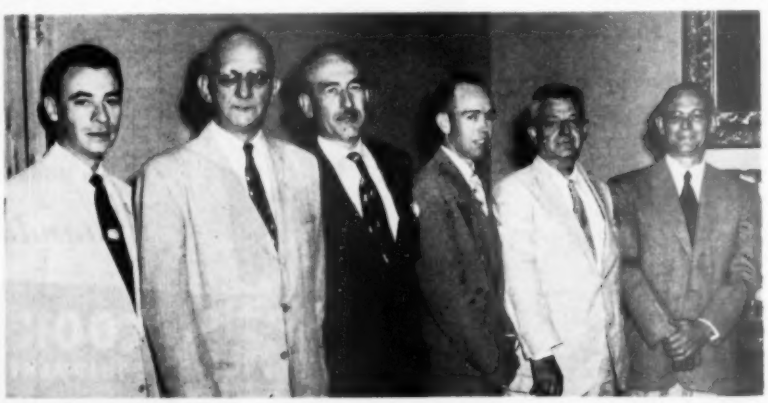
Ed C. Burris, vice-president and general manager, Texas Manufacturers Association, Houston, Texas, in the opening convention address, urged businessmen not to become complacent because of a new administration in Washington. He stated that management over the years has been negligent in public affairs, even though business institutions are made possible by the freedom form of government provided by our constitution. He declared that management must properly exercise the leadership vested in it or American institutions will deteriorate and society will fall prey to some form of "ism" inimical to the nation's capitalistic structure.

At the general business meeting, the following officers were elected: William F. Smith, vice-president, Black-Brollier, Inc., Houston, Texas, president and director; R. P. Brown, Lubbock, Texas, vice-president and director; and Everett E. Knott, Texcrete Co., Dallas, Texas, secretary-treasurer and director. Other new directors are Vernon Cole, Texas Concrete Works, Waco, Texas, retiring president and new board chairman; Thomas H. Jewell, Jewell Concrete Products, Waco, Texas; Lewis Lloyd, Alatex Construction Service, Inc., New Orleans, La.; and C. B. Jones, Texcrete Co., Pharr, Texas.

The membership report revealed that two new members had been admitted to the association, namely: Dodds and Fountain, Greggton, Texas, active member; and Stearns Manufacturing Co., Sante Fe, N. M., associate member.

Other business included the authorization of an annual scholarship fund of $750, to be administered by the Texas Society of Architects, and the authorization of $5000 for use by Southwest Research Institute in its program of research on a new type

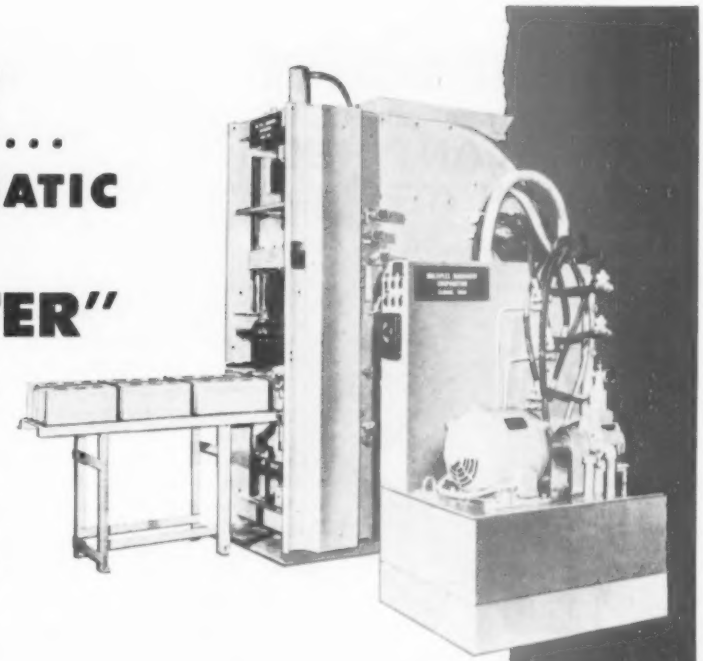
(Continued on page 210)



New officers and directors of Texas Concrete Masonry Association are, left to right: William F. Smith, president and director; Everett E. Knott, secretary-treasurer and director; Vernon Cole, retiring president and director; Thomas H. Jewell, director; Lewis Lloyd, director; and C. B. Jones, director. R. P. Brown (not shown) is vice-president and director

For fast production of low-cost quality block . . .

BUY AN AUTOMATIC MULTICO "BLOCKMASTER"

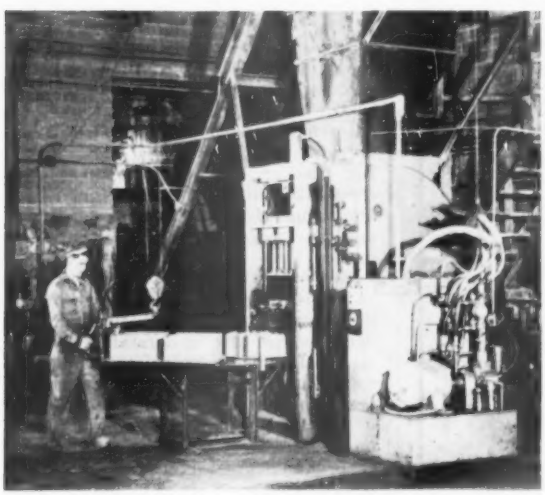


Multico BLOCKMASTER installations will pay for themselves in an average of 18 months. These durable, dependable block machines make even a small plant competitive because they mass produce all sizes and shapes of low-cost quality block. All operations except off-bearing are fully automatic and are variable to meet production needs. Install a Multico BLOCKMASTER and eliminate production bottlenecks in peak seasons.

Multico field engineers will be glad to discuss your problems and to make recommendations without obligation. Over 45 years of on-the-job experience in the industry assure you of top quality equipment and service.

Check these Features!

- LOW INITIAL COST
- MINIMUM MAINTENANCE
- FULLY AUTOMATIC
- MAKES ALL SIZES AND SHAPES
- HANDLES ANY AGGREGATE
- TAMPS UNDER POWER VIBRATION
- PERMITS QUICK MOLD BOX CHANGES
- SMOOTH, POWERFUL HYDRAULIC OPERATION
- SEPARATE POWER AND CONTROL UNIT
- AVAILABLE IN 2 and 3-BLOCK MODELS



Another Profitable "Blockmaster" Plant

This Model 2 machine is operating at 3½ to 4½ cycles per minute at the LORAIN CRYSTAL ICE COMPANY, Lorain, Ohio. John P. Kocak, Manager, reports, "The Multico machine makes good block on a production basis. It has been a profitable investment and has kept us competitive in price and quality."

WRITE FOR BULLETIN FOR ADDITIONAL DETAILS.

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MULTIPLEX MACHINERY CO.
DIVISION OF MULTIPACK, INC.

101 FREMONT STREET **ELMORE, OHIO**

MANUFACTURERS OF BLOCK MACHINES • MIXERS • SKIP HOISTS • STRIPPERS • ELEVATORS

Air-Entrained Concrete

(Continued from page 194)

strength of the concrete in the structure. Many in the industry have been penalized by such inefficient, inexcusable sampling practices. When possible, the sample should be taken from concrete in place, after vibration. If the sample of concrete that is to be vibrated must be taken from the mixer chute, the sample itself should be vibrated to simulate the concrete in the structure. Unless one or the other of these sample techniques is followed, the air-entrained concrete is not being given fair treatment.

As we have seen, the problem of strength loss resulting from air entrainment is restricted to rich, highly workable mixes. Even so limited, this problem can become burdensome on days when you must face premature stiffening and quick setting caused by high temperatures and the use of hot cement. Premature stiffening produces a direct reduction in strength of the concrete, (even at identical water-cement ratios), and lessens the efficiency of the air-entraining agent. The common job practice of adding more water to get workability, intensifies the problem in further reducing the effectiveness of the already less efficient, (hot), cement.

The solution of this problem is not in either additional cement or more water. If possible, the temperature of the concrete should be lowered. In many areas, operators will find that refrigeration will cost them less than the cement they waste in high temperature concrete. In these areas, on many operating days, contractors would be willing to pay a higher price for "temperature controlled" concrete. Certainly, the length of time between mixing and placing should be shortened; the fine aggregate should be coarsened; additional air should be entrained to give required workability for placing; the concrete in place should be vibrated to eliminate the additional air necessary for placing; and the sample should be vibrated so that the test specimen is representative of the concrete in place after vibration. The solution of this problem, although not too difficult, does require the understanding and cooperation of the specification writer, contractor, ready-mixed concrete operator and the testing engineer.

Indeed, such understanding and cooperation are essential if the many truly important, structural and economic benefits of air entrainment are to be made generally available to the building industry. For full realization of these benefits, we need better specifications, improved processing procedures, more efficient job handling practices, new sampling routines and changes in testing techniques.

Air entrainment by performance has earned widespread acceptance. The advantages of air entrainment so far outweigh possible disadvantages,

that there can be no justification for not specifying and using air-entrained concrete for practically all construction purposes. Air is a new, important ingredient of concrete. As ready-mixed concrete operators, it is our obligation to properly control its use.

(To be continued)

Western Pipe Meeting

(Continued from page 208)

Nick Rogers, Reedley Cement Pipe Co., Reedley, Calif.
William S. Rogers, Rogers Materials Co., Madera, Calif.
L. Siakovich, Clovis Concrete Pipe Co., Clovis, Calif.
William W. Smith, Valley Concrete Pipe & Products Co., Yuba City, Calif.
Frank H. Souther, Sunnyside Concrete Pipe Co., Sunnyside, Wash.
Fred Spickerman, Ed Spickerman Concrete Pipe Co., Lodi, Calif.
Albert Straub, Alta Concrete Pipe Co., Dinuba, Calif.
Nick Vuicich, Clovis Concrete Pipe Co., Clovis, Calif.
Charles E. Ward, Utah Concrete Pipe Co., Ogden, Utah
Carl B. Warren, Spokane Concrete Pipe Co., Spokane, Wash.
H. A. Weigand, United Concrete Pipe Corp., Baldwin Park, Calif
C. V. Whalley, California Concrete Products Co., San Jose, Calif.
G. L. White, White's Concrete Pipe, Littlefield, Texas
G. D. Williamson, Valley Concrete Pipe & Products Co., Yuba City, Calif.
Fred K. Wooley, Concrete Conduit Co., Lindsay, Calif.

Associate Members:

W. J. Ashton, Waterman Industries, Inc., Exeter, Calif.
W. H. Cooper, California Wire Cloth Corp., Fresno, Calif.
A. A. Courteney, Jr., Ideal Cement Co, San Francisco, Calif
Robert Decker, Edward R. Bacon Co., Fresno, Calif.
E. J. Eckel, Eckel Engineering Co., San Jose, Calif.
Fred Hansen, California Wire Cloth Corp., San Francisco, Calif.
Henry Havert, Edward R. Bacon Co., Fresno, Calif.
D. F. Hawley, Santa Cruz Portland Cement Co., Stockton, Calif.
Jack Janasse, Permanente Cement Co., Oakland, Calif.
Al C. Kearney, Kearney Pattern Works & Foundry, San Jose, Calif.
V. E. Kearney, Kearney's Manufacturing Co., Fresno, Calif.
George E. Kellar, Kellar Valves, Coachella, Calif.
H. J. Learn, Edward R. Bacon Co., Fresno, Calif.
Charles A Lindgren, Calaveras Cement Co., Fresno, Calif.
M. J. London, Calaveras Cement Co., San Francisco, Calif.
Everett Lorence, L & W Manufacturing Co., San Jose, Calif.
William J. MacKenzie, Tuerck-MacKenzie Co., Portland, Ore.
W. R. Palmateer, Martin Iron Works, Ltd., Fresno, Calif
Monroe Park, Permanente Cement Co., Fresno, Calif.
T. K. Partridge, Southwestern Portland Cement Co., Los Angeles, Calif.
W. Thomas Pease, consulting engineer, Monterey Park, Calif.
A. M. Pohl, Pohl Metal Products Co., Oakdale, Calif.
Gene Quest, A. E. Quest & Sons, Lubbock, Texas
Harvey S. Sherman, pipe-laying contractor, Tulare, Calif.
W. T. Sherman, Edward R. Bacon Co., Visalia, Calif.
O. R. Showalter, Jr., Irrigation Appliances, Fresno, Calif.
Neil W. Snow, The Airox Co., Los Angeles, Calif.
Roger Stewart, Martin Iron Works, Ltd., Los Angeles, Calif.
Ben E. Teschner, Monolith Portland Cement Co., Los Angeles, Calif.
W. O. Traphagan, L & W Manufacturing Co., San Jose, Calif.
Jess Triscuit, Ideal Cement Co., Fresno, Calif.
H. L. Vines, Noble Co., Oakland, Calif.
Herrick Waterman, Waterman Industries, Inc., Exeter, Calif.

(Continued on page 210)

J. D. White, Monolith Portland Cement Co., Fresno, Calif.

Association Representatives:

W. C. Bryant, Portland Cement Association, Los Angeles, Calif.
Ephraim Dyer, Jr., Western Concrete Pipe Association, Fresno, Calif.
Robert E. Jones, Portland Cement Association, Bakersfield, Calif.
C. G. Knoll, California Association of Employers, San Francisco, Calif.
Howard F. Peckworth, manager, American Concrete Pipe Association, Chicago, Ill.

Guests:

George Baer, Jetco Inc., Los Angeles, Calif.
J. D. Canaday, Jourdan Concrete Pipe Co., Fresno, Calif.
C. L. Coats, Jourdan Concrete Pipe Co., Fresno, Calif.
C. E. Covey, Stockton Construction Co., Stockton, Calif.
J. W. Fogle, Jetco Inc., Los Angeles, Calif.
E. C. Fortier, U.S. Bureau of Reclamation, Fresno, Calif.
Homer W. Jorgensen, consulting engineer, Modesto & Fresno, Calif.
Leroy Martin, engineer D.P.W., Fresno, Calif.
Bert McMillin, Pitman Manufacturing Co., Temple City, Calif.
Chris Reid, Nomellini Construction Co., Stockton, Calif.
A. R. Sonksen, Jourdan Concrete Pipe Co., Fresno, Calif.
C. J. Sorensen, Stockton Construction Co., Stockton, Calif.

Texas Meeting

(Continued from page 206)

of inverted triangular foundation. Cedric Willson, vice-president, Texas Industries, Inc., Dallas, Texas, in describing the work of the institute, predicted that if tests on the new-type foundation are successful, the sales potential of practically all masonry manufacturers can be greatly increased. Mr. Willson also discussed the new drying and shrinkage tests

Left, Vernon Cole, retiring president of T.C.M.A.; right, A. J. Clark, retiring board president

which he has been supervising at Texcrete plants throughout the state.

Glen C. Barnes, past-president, National Concrete Masonry Association, in a speech on "New Curing Methods and Trends in Our Industry," described developments in infra-ray curing, based on tests conducted at his Syracuse, New York, plant, relative to high-temperature curing at 350 to 400 deg. without pressure, and results of shrinkage tests conducted at Toledo University. He also commented on the Corps of Engineers reports, autoclave curing, yard cubing, truck unloaders and job cubing.

S. H. Westby, P.C.A. manager, Housing and Cement Products Bu-

Glen C. Barnes, past-president, N.C.M.A., speaks to T.C.M.A. group on "New Curing Methods and Trends in Our Industry"

reau, urged greater use of public relations in the promotion of concrete masonry. His proposal included: tying in local advertising with national advertising of the P.C.A.; adequate and proper information for prospects, including names of architects, builders and lending agencies; and a list of available concrete masonry homes for prospects to visit.

The fall meeting of the association will be held in Amarillo, Texas, with Crowe-Suelde Cement Co. as member host.

Cavity Walls

THE NATIONAL BUREAU OF STANDARDS recently announced the publication of Building Materials and Structures Report No. 136, on "Properties of Cavity Walls." The report summarizes the results of structural tests conducted on cavity walls of concrete block, brick, and structural clay tile. Other tests were also made on the properties of wall ties, rain penetrability, thermal transmittance, and fire resistance. Topics covered in the report include: Cavity-Wall Design; Materials; Construction of Walls; Structural Properties; Water Permeability; Heat Transfer; Fire Resistance; and Discussion and Summary. Copies of the report may be secured from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for $0.15 each.

Ownership Change

RAY BROCE, owner of Broce Construction Co., Dodge City, Kan., recently announced the sale of one-third interest in the company's ready-mixed concrete plant at Dodge City, to Ed O'Dell, Buffalo, Okla. Mr. O'Dell is to take over active management of the plant. Installation of a concrete block plant is planned for the immediate future. The firm is to be called Broce-O'Dell Concrete Products.

"He Might Need It..."

"He never was much for letter-writing when he was in college. But he must know how anxious Mother and I are . . . now that he's off in Korea. Haven't heard from him in six weeks. Of course, they say 'no news is good news' . . . but I wonder. Maybe he can't write . . . because . . . maybe he's in a hospital somewhere. And maybe he needs blood. I don't know . . . but I'm not taking any chances. That's why *I'm* giving blood."

★ ★ ★

Yes, all kinds of people give blood—for all kinds of reasons. But whatever *your* reason, this you can be sure of: Whether your blood goes to a combat area, a local hospital, or for Civil Defense needs—this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

NATIONAL BLOOD PROGRAM

Business Executives!

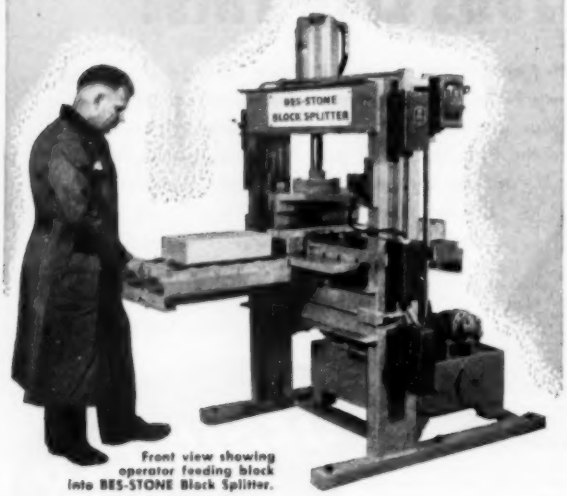
✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Has your company given any recognition to donors?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of cooperation?
- ☐ Was information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

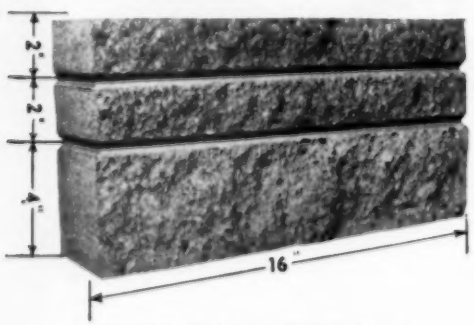
BES-STONE
BLOCK SPLITTER



Front view showing operator feeding block into BES-STONE Block Splitter.

- **Operates Automatically**
- **Produces 960 Split Block Per Hour**
- **Easily Adjusted for Various Heights**
- **Splits in a Straight Line — No Culls**
- **Has a Powerful Hydraulic Action**
- **Combines Quiet Operation with Safety**

Here is another Besser machine — the BES-STONE Block Splitter — designed primarily for the Concrete Products Industry. The machine splits block with speed and precision, in a variety of modular sizes. It's fully automatic. The block is placed under the knife automatically . . . the blade descends with a smooth, hydraulic action . . . and the split block is ejected by the incoming block. The operator is always at a safe distance. The BES-STONE Block Splitter enables plant operators to offer additional lines and affords new profit possibilities. Write for Bulletin No. 95A.



BES-STONE in Modular Sizes

BES-STONE, the product of the BES-STONE Block Splitter, is a new masonry unit with a split-stone appearance, made in many sizes and in a series of attractive, permanent colors. You'll find it complements, and greatly increases your sales of standard stripper block.

BESSER

Complete Equipment for Concrete Products Plants

BESSER MFG. CO., ALPENA, MICH., U. S. A.

Add VERISET

THE READY-TO-USE LIQUID ADDITIVE FOR READY-MIXED CONCRETE AND YOU GET

Increased Compressive Strength, or can use more aggregate with less cement and obtain same compressive strength — Air-Entrainment —Excellent Workability—Greatly reduced Bleeding and Segregation—15% to 25% Reduction in required water—

VERISET also

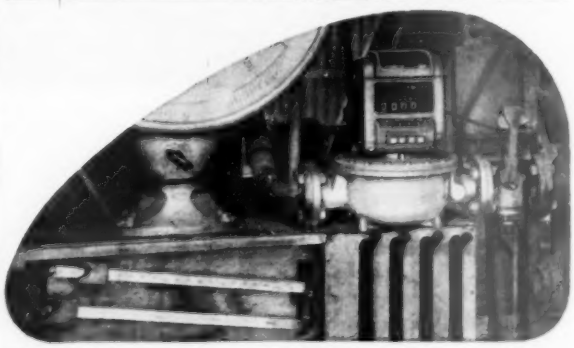
- **Permits the use of lower graded aggregates**
- **Saves cement**
- **Minimizes shrinkage**
- **Shows no loss in compressive strength even with air-entrainment up to 12%**

All these facts add up to **BETTER QUALITY CONCRETE** at substantial savings in costs of material and operation.

Write for further information, test data and sample

VERISET CORPORATION

150 Nassau Street **New York 38, New York**



Better Concrete
with *METERED* Water

Most important problem in ready-mix concrete is control of *water* . . . and the simplest, surest control is this Auto-Stop water meter. Just push buttons to set pounds or gallons required, open the valve, and the meter shuts off automatically. Speeds loading, and improves block machine performance. Easy to read, saves space, and reduces structural requirements. Round dial non-Auto-Stop also available. Write today for full details . . .

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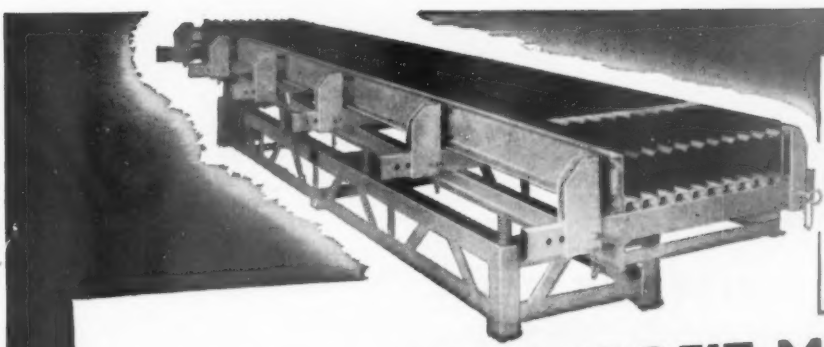

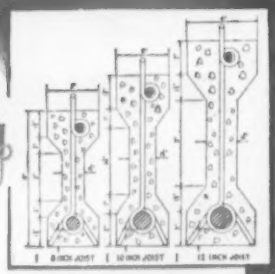

. . . ADD A NEW PROFIT-MAKER!
INCREASE YOUR VOLUME

Produce money-making concrete joists with the Kirk & Blum Heavy Duty Vibrating Table . . .

Only small investment required!

The addition of the Kirk & Blum Vibrating Table to your present equipment requires a very small initial cost, enables you to make an entirely new line of 8", 10" and 12" joists in 20 and 24 ft. lengths.

Cash in on the ever-growing demand for steel-reinforced concrete joists. Your experience and contacts in the building trade should make it easy to build up a profitable business in this new line. Concrete joists are simple to make, have unusual strength, are termite proof. The KIRK & BLUM Type "S" Heavy Duty Vibrating Table is capable of multi-production of concrete joists, allowing a fine profit-margin. Easily produced by unskilled operators. For complete details and prices, write to The Kirk & Blum Mfg. Co., 3210 Forrer Street, Cincinnati 9, Ohio.

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Manufacturers of steel forms of all types . . . Curb, Gutter, Sewer, Road

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POWER LIFT TRUCKS

This catalog brings you a clear-cut picture of WHY Erickson Power Lift Trucks are so economical—and so successful in speeding up block or pipe handling at reduced costs:

FORK MODELS—from 4,000 to 16,000 lbs. capacity.
SIDE-SHIFTER—for faster stockpiling and loading.
PLATFORM MODELS—5,000, 6,000, and 7,000 lbs. capacity.
4 SPEEDS FORWARD, 4 SPEEDS REVERSE—available on all models for speedier operation.
"CUSTOM-BUILT"—Erickson design allows easy modification.

ERICKSON GIVES YOUR BUSINESS A LIFT

REQUEST YOUR COPY TODAY

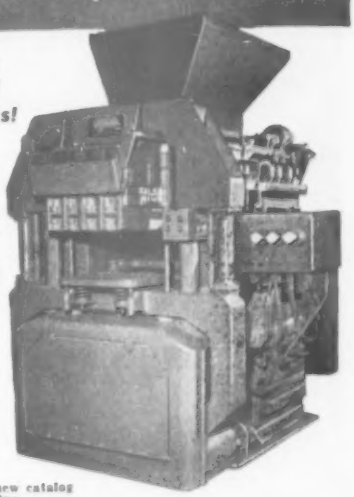
Before you invest in any lift truck, it will pay you to investigate what Erickson has to offer—then compare values!

Erickson POWER LIFT TRUCKS, Inc.

1405 Marshall St. N. E. Minneapolis 13, Minn.

Columbia's NEW, IMPROVED Fully Automatic 2-BLOCK

Leads the field in fast production of high quality blocks!



Rugged construction dependable operation, low initial investment—backed by years of manufacturing experience—assure the Columbia owner more profitable block production.

Columbia's Model 8, with electronic controls, is today's outstanding 2-block machine! Write today for details!

Yours FREE! Write for new catalog of the Columbia line.

NATIONWIDE SERVICE...

Sales, parts and maintenance headquarters in Washington, California, Wisconsin, Mississippi, Florida, New Jersey, South Carolina, Virginia and Ohio.

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An expanded shale aggregate for lightweight block and concrete

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FOR SALE

3-yd. Jaeger mixer on 1941 GMC, $1950. Good condition.
2-yd. Jaeger on 1941 IHC, $1250. Good condition.
2-yd. Rex on 1941 IHC, no tires, $495. All hi-discharge.

Foster Concrete Co., Bowling Green, Ohio

FOR SALE

Jackson and Church, Model CPB, 6 pocket Brick Press, skip hoist, 12 cu. ft. Stearns mixer, turntable and 31 steel brick skids. All motors and controls 440 V., A.C. $2000. FOB plant. Call or write: DAVID TRAFELET, 276 West Grand River, East Lansing, Mich., Phone: ED23936.

FOR SALE

COMPLETE CONCRETE PIPE PLANT EQUIPMENT

(1) Concrete pipe machine—12"—72" diameter 4 ft.—6 ft. lengths. (2) Besser Mixer. (3) Besser Skip Loader. (4) Wire Roller. (5) Boiler, etc. Guaranteed A-1 condition.

BOX L-63, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

FOR SALE

Model 9 Jolterete with offbearer, air compressor, 2 turntables, 10" mold box like new, 4" mold box, 8" mold box hard core finish (used about 2 months), 4000 8" steel pallets, 2000 4" steel pallets. Many extra parts. This machine is in very good condition.

ANTHONY COAL AND SUPPLY CO.
Corner Southern Blvd. and Mathews Road
Youngstown, Ohio

FOR SALE—One Sauerman 4 Cu. Yd. Crescent Scraper. Complete with all Blocks and Cables. 22 foot Mast and Rapids Shifting Device. Three Drum Roller Bearing Hoist. This unit is complete for operation equipped with a 200 HP electric motor. For complete specifications and price contact: **THE BATTLE CREEK GRAVEL CO., 3800 DICKMAN ROAD, BATTLE CREEK, MICH.** This unit was used only for 12 weeks and is like new.

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MORTAR COLORS
made by
BLUE RIDGE TALC CO., INC.
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PALLET RINGS
Write for full information
TEXAS FOUNDRIES
LUFKIN, TEXAS

PRICED FOR QUICK SALE

1—Stearns Model 9 Joltcrete complete with dual vibration, power carriage and power offbearer.
1—8" Attachment with 4,500 pressed steel 50% air space pallets.
1—8" Header block attachment.
1—3" Attachment with 4,000 pressed steel pallets.
1—4" Attachment with 3,000 pressed steel pallets.
1—12" Attachment with 2,000 pressed steel 50% air space pallets.
60—Model 72 steel racks.

All equipment guaranteed to be in perfect condition and offered at sacrifice prices. Cash or terms. If desired we will install machinery in your plant and train your crew in its operation.

OLSEN SALES COMPANY
ROCK RAPIDS, IOWA

CEMENT COLORS

Write for free samples and prices of "LANSCO" CEMENT COLORS produced in 50 attractive shades. Packed in bulk and in 1 lb. and 5 lb. packages.

manufactured by

LANDERS-SEGAL COLOR CO.
73 Delevan St. Brooklyn 11, N. Y.

FOR SALE

60—Block Racks.
800—18" x 18" x 5/16 Steel Pallets.
1—28 S Stearns Mixer with New Complete Set of Liners. Assortment of Lith-I-Block L 3 Attachments.

CHRISTENSEN CONCRETE PRODUCTS
GRAND ISLAND, NEBR.

JOLTCRETE #7

MIXER, SKIPS & PALLETS

J. D. CLARK BLOCK & SUPPLY
4930 Belleville Road
BELLEVILLE, MICHIGAN

FOR SALE

Model 816 New Holland Swing jaw crusher. Complete with 30 H.P. motor, starter and practically new endless transmission belt. $750.00 F.O.B. our plant.

CONCRETE PRODUCTS COMPANY
39 Folly Road, Charleston 43, S.C.

WANTED

Six sections Manganese steel segments for 16" x 16" New Holland roll crusher. Sections may be plain or corrugated.

HUD-CIN BUILDING PRODUCTS
700 North Avenue, Westfield, New Jersey

FOR SALE

1—2 Cu. Yd. Jaeger High Dumps Cement Mixers. Mounted on 1944 G. M.A.C. Tandem. (Army).
1—2 Cu. Yd. Jaeger High Dump Cement Mixer. Mounted on 1948 Heavy Duty 2 Ton.

Priced very reasonable. Trucks used daily. MARSICO BROTHERS, P.O. 549, Montgomery, W. Va.

FOR SALE

42" Stedman—2 row Heavy Duty Disintegrator. Less than 60 days usage. New inner cage and end liners. 40% less than original cost. SPRINGFIELD CEMENT PRODUCTS CO., 1800 N. Limestone St., Springfield, Ohio. PH: 5-1504

FOR SALE — LIKE NEW

2 APPLEY-YELLEN HI-SPEED BLOCK MACHINES. FACTORY REBUILT TO USE PLAIN PALLETS.

JOHN J. YELLEN, PERTH AMBOY, N. J.

FOR SALE

Jumbo Brick mould, stripper head, two Vibrating shafts and weights for a Besser Vibrapac; new, never used. Write P. O. Box 22, Ridgefield, New Jersey.

SPECIALTY PLANT FOR SALE

Concrete Septic Tank—Drain Tile—Stock Water Tanks—Chimney Blocks and forms for dozens of other items. Plus good truck with monorail for setting tanks. Located in rich industrial and farming section. Established 1946. Total price, including one year rent on building, $6,800.00. One half cash plus inventory at cost to reliable party. BOX L-69, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

BUILD GOOD WILL FOR '53

With U.B. Line stretchers the most economical way, to keep your name before your mason's and mason contractors every working day of the year. Line pins, twigs, corner ties, and tools for the Blocklayer.

UNITED BUILDERS
1822 Lindberg Drive, Muskegon, Mich.

LOWER COST
PACKER-HEAD WINGS
Proved to last as long or longer — yet cost considerably less. Write for prices.
TEXAS FOUNDRIES
LUFKIN, TEXAS

Wanted for Stearns Joltcrete #7

6" Mold Box Attachment Complete & Pallets.
12" Mold Box Attachment Complete & Pallets.
Plain Pallet Block Machine.

OCEANA BLOCK WORKS
P. O. Box 90, Oceana, Virginia

CONCRETE PIPE SUPERINTENDENTS
CAST SUPERINTENDENTS

First class opportunity with a financially well-established national organization. Require high calibre, experienced men who can supervise manufacturing operations, take complete charge of large field projects. Experience with machine-made pipe will prove of added value.

BOX L-67, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

A large New Jersey Concrete Concern has an opportunity for a ready mixed concrete truck Dispatcher, must be experienced. Please write in care of BOX L-43, ROCK PRODUCTS, 309 West Jackson Blvd., Chicago 6, Illinois.

WANTED—Sales Engineer for Concrete Products Division of large builders supply yard serving thumb and river district. Experience in production of concrete and concrete products desired. Construction experience also desired. Civil Engineering degree required but good practical experience would be accepted. References required from past experience. Address replies to: **FOSTER BUILDERS SUPPLY CO., P.O. BOX 535, PORT HURON, MICHIGAN.**

WANTED: Septic Tanks that need cleaning!

BIONETIC is a safe, sure, economical method.
Cleans sewage solids from tank.
Eliminates odors.
Cleans tile fields, prevents plugging.
Cleans grease traps.
Harmless to humans and plumbing.

BIONETIC at $4.25 per pound, or case of 12 one pound containers $48.00, 25 pound drum $3.25 per pound.
Some Dealer and Distributor Franchises Open.
Advisory Service, write us.

P. O. Box 6724, Dept. CPM RELIANCE CHEMICALS CORPORATION Houston 5, Texas

A SMALL CLASSIFIED

PRODUCES QUICK RESULTS

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

One Bucket elevator for aggregate manufactured by Columbus Conveyor Co. Purchased new July 1952 and never erected. NEVER USED. Length C-C 51'-6½"; Capacity—100 tons per hour; Motor Electric, 15 H.P., 3-Phase, 220-240 V; Buckets 14" x 7" Spaced 16"; Conveyor belt 112'—4" x 16" 7 ply. With boot and sprout. Cost new $3871.00.

One Butler No. 7 track plant No. E 1370. This track plant is for unloading bulk cement at railroad siding and loading into bulk trucks. Track screw 10" x 17'—3⅜"; Cement elevator capacity 230-260 bbls. per hour; Overall height 25'—5"; Height discharge sprocket 12'-0". Powered by LeRoy H.P. gas engine Model XP 30. Purchased new October 1, 1952 for $3736.00. This plant purchased new—never erected and NEVER USED.

One—400 bbl. one-compartment auxiliary, ground storage cement bin—Blaw Knox. This bin purchased new July 1952 at cost of $2945.00.

One Barber-Greene portable belt conveyor; 50 feet long; 24" belt; Wisconsin gasoline motor; 16 feet of extra new belt; in perfect working condition.

HOWAT CONCRETE COMPANY
South Capitol at S St., Washington 4, D.C.

BARGAIN DAY, TODAY!

SWAP • SELL • TRADE

4—No. 9 STEARNS Jolteretes	each	$140.00
2—No. 7 STEARNS Jolteretes	each	$750.00
1—28 cu. ft. STEARNS Mixer		$950.00
1—28 cu. ft. STEARNS Skip Loader		$950.00
2—18 cu. ft. STEARNS Concrete Mixer	each	$650.00
1—18 cu. ft. STEARNS Skip Loader		$400.00
2—12 cu. ft. STEARNS Concrete Mixers	each	$300.00
40—Racks for STEARNS No. 9, for use with spade type Off Bearer	each	$ 22.00
100—Hinge type racks	each	$ 15.00

1000's of PALLETS IN STOCK
Send tracing or sample for quotation

Write Wire Phone | **GENERAL ENGINES CO.**
PHONE: GLOUCESTER 6-1337 • 307 HUNTER ST., GLOUCESTER, N. J.

FOR SALE

Stearns Jolteretе Model 9 with offbearer, power carriage. 4", 8" and 12" molds. Pallets: 4"—6,000. 8"—3,500, 12"—800. Priced for quick sale.

CONCRETE PRODUCTS CO.
BILLINGS, MONTANA

FOR SALE

2 Hydro-Korpak Block Machines.
3200 Pallets 8x8x16. 1000 Pallets 12x8x16.
1400 Pallets 4x8x16.
One Rotary Pallet Dunker.
Can be seen in operation. Installing larger equipment. Best offer takes.

BAILEY DUNBRIK COMPANY
St. Augustine, Fla.

FOR SALE

2—1942 White Trucks, Model WA-20, complete with 2 yd. Rex High Discharge Mixers at $1,000.00 each.

These units in good running order. Taken out of service to make room for larger equipment. May be inspected at 1105 E. 40th St. yard of the Cleveland Builders Supply Co., Cleveland, Ohio.

FOR SALE

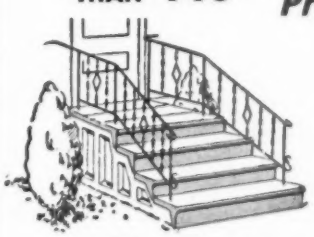
1—F. C. GEORGE, series 400, Hydraulic Block Machine; good condition. Channel iron pallets. $2500.00 F.O.B. Leesburg, Florida. MASONS CONCRETE CO., 13th St. & S.A.L. RR. Leesburg, Florida. Phone 628.

WANTED

Used Concrete Pipe Forms in good condition. State Price, Sizes, etc.,

JAMES D. CAPRON
Boonville, New York

NOW MORE THAN 140 LICENSED MANUFACTURERS *Producing*



Patented
homeward *Concrete* STEPS

A Small Investment That Pays Big Dividends

Homeward all metal forms are precision built to produce a product that requires no hand finishing.

The exclusive franchise for your territory may still be open.

For Complete Information Write
ROGER F. WILLIAMS, Licensor
3420 S. W. 9th St. Des Moines (15), Ia.

Memo **. . . "must write today" for full information on**

CARPENTER *Profit-Boosting*

SEPTIC TANK FORMS AND HANDLING EQUIPMENT

Concrete producers from coast to coast are reaping extra profits from septic tanks made with CARPENTER Equipment. This method assures big output of quality units, economically produced. One man handles our delivery rig.

CARPENTER MFG. CO.
Phone 28938, R.F.D. 1, Box 470
Richmond 23, Va.

COLORS

SYNTHETIC CONCENTRATED

Red

Yellow **Blue**
Green **Brown**

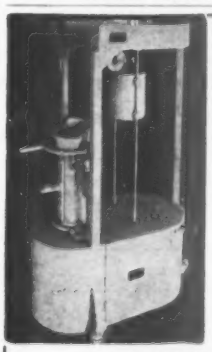
Black

— Color Card on Request —

REICHARD-COULSTON, Inc.

15 East 26th St., New York 10, N. Y.

Factory: **Bethlehem, Pa.**



BIG PROFITS — SMALL INVESTMENT

THE FASTEST SELLING, MOST PROFITABLE DRAIN TILE ARE MADE ON THE

MARVEL JR. DRAIN TILE MACHINE

Low in cost, rugged, simple—you are in production the day your machine arrives. Small space, no skilled labor, large production, big demand for products.

We are the World's largest manufacturer of aluminum Molds for Ornamental Concrete Products.

Investigate—Write for Bulletin TODAY

CONCRETE MACHINERY CO.
DRAWER 60-CP HICKORY, N. C.

INDEX TO ADVERTISERS IN THE CONCRETE PRODUCTS SECTION OF ROCK PRODUCTS

SEE INDEX OF ROCK PRODUCTS SECTION ADVERTISERS ON PAGES 229, 230

HERE ARE HELTZEL'S NEW *COMPLETELY AUTOMATIC ELECTRONICALLY CONTROLLED* BATCHING PLANTS...

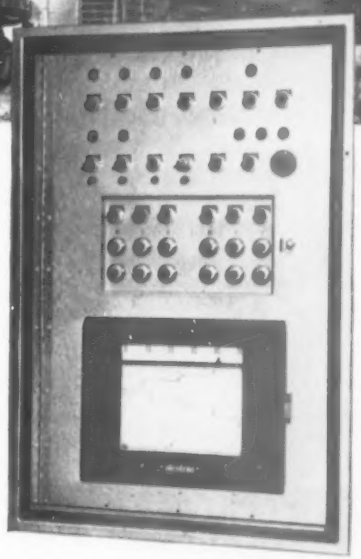
Two new Heltzel Batching Plants at work on the Ohio Turnpike. Built to conform with Ohio Turnpike Commission specifications, the Cement Plant (left) has a 400 bbl. capacity with a 375 bbl. recirculator. Three-compartment aggregate Plant (right) holds up to 200 tons.

Here's real news for contractors who want batching equipment that will do more with less labor. The new electronically actuated fully automatic Heltzel plants designed for road builders, truck mixer and central mix operations.

Push button operated by one man these job-tested plants will batch up to 250 yards of perfectly proportioned batches per hour . . . with 29 separate batch combinations immediately available to the operator. Each batch, time and amount electrically recorded for easy daily tabulation.

Portable, the plants were designed for quick set-up and knock-down, easy over-the-road handling. For permanent installation Heltzel's combination cement-aggregate plant would be used instead of two separate plants.

For additional information write or call **The Heltzel Steel Form and Iron Co., Warren, Ohio,** and ask for Bulletin O-21.

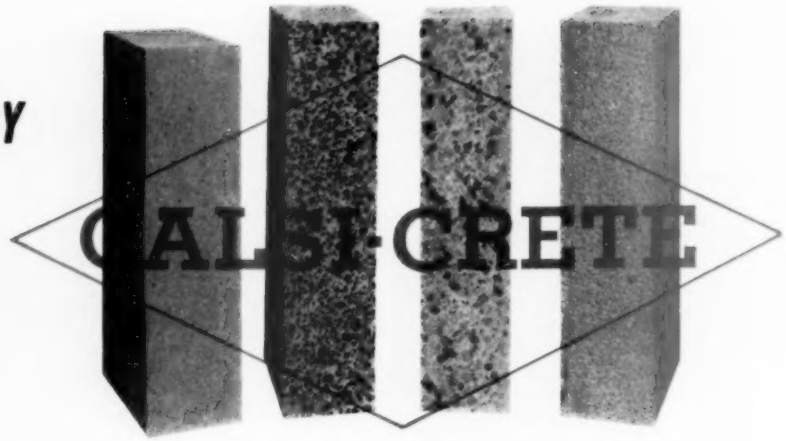


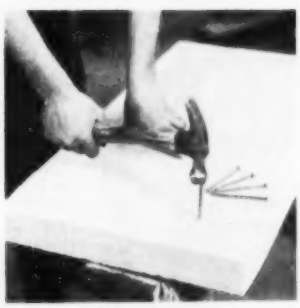
Push button panel with recording equipment. Each of the 29 batch selection buttons controls a completely different mix. Panel will be wired to suit your individual requirements. Recording equipment optional.

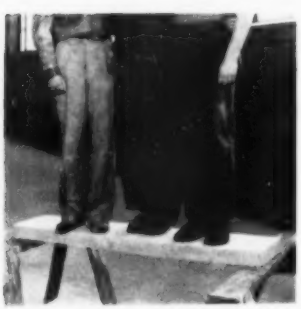
— Naturally It's A Heltzel *Product —*

announcing

REVOLUTIONARY







THE IDEAL BUILDING MATERIAL!

LOAD-BEARING, INSULATING CELLULAR CONCRETE

CALSI-CRETE'S versatility makes it ideal for a wide range of building uses, including load-bearing building blocks, roof planks, insulating roof slabs, cores for firedoors and partitions and many other applications. Calcium silicate hydrate products made by the **CALSI-CRETE** process offer these outstanding advantages over other building materials:

1. **Light but strong, with high thermal and sound insulation qualities. (K factor for 45 lb. per cu. ft./load-bearing CALSI-CRETE is only 1.1 Btu./Ft.^{2} hr. compared with 9.1 for dense concrete)**
2. **Stable, durable, fireproof and hygienic.**
3. **Great resistance to water penetration and frost action because of unicellular structure. Cracking is avoided by negligible wetting and drying movement, least of any known building material.**
4. **Can be cut, sawed, drilled, chased, screwed and nailed, and provides an excellent key for plastering and rendering.**
5. **Cost is less than brick, dense concrete or wood in finished construction.**
6. **Easily made with raw materials abundant in virtually every part of the country.**
7. **Ease of handling lowers production and utilization costs.**
8. **For applications where load-bearing is not a factor, CALSI-CRETE can be made with 20 lb. per cu. ft. density and a K factor of 0.6.**

Autoclaved calcium silicate hydrate products are now being introduced in the United States after years of successful use in Sweden and England as high quality lightweight concrete building materials.

Write for information on franchises or bulletin describing this new material.

CALSICRETE *corporation*

321 N. HAMILTON
SAGINAW, MICHIGAN

CLASSIFIED ADVERTISEMENTS

Allis-Chalmers Blake Improved Jaw Crusher. 30" x 18" V-Belt Fly Wheel Drive. Excellent Condition. BOX L-62, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

ELECTRICAL MACHINERY

Motors and Generators, Control and Repair Parts. Large Stock. New and Rebuilt. Guaranteed Expert Repair Service. Send us your inquiries.

V. M. NUSSBAUM & CO.
Fort Wayne, Indiana

FOR SALE

2—**EUCLID, Model 9 FDT Tractors with 58 W Bottom Dump Trailers — CUMMINS DIESELS, Excellent Condition, and Excellent Rubber.**

WINTER BROTHERS MATERIAL CO., INC.
VI 3-4052 Sappington 23, Missouri

SALE OR RENT

1—675 CFM Chi. Pne. O.C.E. 125 HP Syn. Mtr.
1—30 Ton Davenport Diesel Mech. Locomotive.
1—45 Ton GE Diesel Elec. Locomotive.
1—10 Ton Krane Kar Kne. Tires.
1—20 Ton Ohio Steam Locomotive Crane.
1—25 Ton Ohio Diesel Locomotive Crane.
1—35 Ton P&H 555 Truck Crane.
1—20 Ton P&H 255 Truck Crane.
1—5W Monighan Walker 116' B.

B. M. WEISS CO. Girard Trust Company Bldg., Philadelphia 2, Pa.

FOR SALE

1—36" FC Telsmith Gyrasphere Crusher complete with drive and Caterpillar D 13000 Diesel Engine. This machine has been operated 577 hours.

PALMETTO QUARRIES CO.
P. O. Drawer 5185, Columbia, S. C.

FOR SALE

Sand and Gravel Business on Mississippi River serving community of 40,000. Within 200 miles of Chicago on main-line railroads. Thirty-seven years of profitable operation. Can be Financed. BOX L-71, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

Bucyrus-Monighan Walking draglines; 9W, 7W, 6W, 200-W, 5-W, diesel, electric.
Gyratory crushers, Telsmith 26", and 20".
Nordberg-G.E. 875 KW diesel-elec. gen. set.
Marion 7½ and 4-yd. shovels, elec., diesel.
Bucyrus 120B elec.; Marion 93-M diesel shovels.
Shovels, cranes, dragla., 1½ to 18 yds. (15).
Locomotives, 7 to 80 tons, diesel, gas.
Whirley gantry cranes, 35-50 tons.
Bucyrus 2½ yd. shovel att. only, 55B-52B.

H. Y. SMITH CO.
828 N. Broadway, Milwaukee 2, Wis.

WANTED

1 yard and 1½ yard heavy digging buckets, McKiernan Terry Hammers, all sizes stone grapples up to 15-ton capacity. Pumps 6"-8"-10" gas and Diesel, Tunnel cars 24"-30"-36".

MAHONEY-CLARKE, INC.
217 Pearl Street, New York 38, New York

WANTED

20 OR 25 TON TRUCK CRANE.
30 TON DIESEL LOCOMOTIVE CRANE.
45 TON DIESEL ELEC. LOCOMOTIVE.

B. M. WEISS COMPANY
Girard Trust Company Building
Philadelphia 2, Pa.

WANTED

30 Yd., 50 Ton, Elevated Bin with gate in center of the bottom; clearance for trucks underneath must be at least 10' wide and 11'6"-12'6" high.

A. & J. BUYERS, INC.
3580 Sheridan Drive, Buffalo 21, New York

Wanted Machinery or Plant

Including Rotary Kilns, Direct Heat Dryers, Pulverizers, Crushers, Ball Mills, Vibrating Screens, Power Shovels and Cranes, Bucket Elevators, Conveyors, Filters, Diesel Engines.

P. O. BOX 1351, Church Str. Sta.
New York 8, N. Y.

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 5047
Pennsylvania C-4-30 Reversible Hammermill.
Cedar Rapids 4023 Hammermill. Diesel powered.
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36" x 48" Jaw Crusher.
Traylor TY 4' with 200 hp. electric motor.

DREDGES

Ellicott 12"x10" new pump with new V-12 385 HP Diesel engine. Port. steel hull.
Ellicott 8" with cutter. Diesel Hull 48'x18'x3'6".
8" Hydraulic. Diesel. On 32'x8' steel pontoons.
Amsco 10" Diesel power portable. Excellent.
6" portable Diesel complete with cutters, etc.
6" H-P twin Diesel drive. Complete.

CONCRETE PLANTS AND EQUIPMENT

3 Koehring 4 yd. tilting mixers complete.
Smith 56-S two yard tilting mixer. Complete.
Port Erie Strayer Concrete Plant 30-40 T.P.H.
Blaw-Knox 300 ton 4 compt. aggr. bin.
54-B weighbatcher conveyor truck hopper apron feeder bucket elevator.
Butler #7 Cement Track Plant 250 bbl. p.h.
Large plant 212 yd 6 compts. agg. & cement elevators, 56-S Mixer.
Butler 250 bbls. cement bin with B-K 100 ton 3 compt. agg.
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Cedar Rapids Portable Super Tandem, excellent.
Pioneer 40-V. New 1946. Portable. Diesel power
Pioneer WA-300, crushing, washing, screening.
Pioneer Portable Plant with 24 x 36 jaw primary and 40 x 22 triple roll secondary. New, 1950.
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾".

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 28x40. Eagle 20x36. Diamond 24x36"
Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20 13x30, 14x36, 18x36, 36x48. Buchanan 36x42.
Good Roads Reliance 15x30. Traylor 14x36, 24x36
Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1030, 1040, 1236, 1536
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14". Newhouse, 21", 36"
Gyrasphere, 18", 28". Intercone Telsmith, Telsmith 51L, 10-B, 13-B, 16-B. Kennedy Van Saun 7, 19, 25¼-S, 37. Traylor Ty 1'8", Ty 2'4", T-4½".
ROLL: Allis-Chalmers 54x24. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18" New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo. Pennsylvania SK2. 22x22. Cedar Rapids 20x33 Jeffrey 26x42, Jeffrey 36x24, 36x40. Dixie 3650
BALL MILL: Hardinge 10'x48" K.V.S. 6'x8' Type M Air swept J-H 6'x6', Hardinge Conical 6 x22". Colorado Iron Works 5'x6'; Marcy No 64½. Hardinge conical 10'x36".
ROD MILL: March 2'x6', 3'x6'. Allis Chalmers 4'x4'. Hardinge No. 8 206. Marcy 8'x12' Hardinge 8'x22".
CONE: Symons 2' coarse bowl, 3' standard head.
TUBE MILL: Smidth 5½x29, K.V.S. 4'x7', Traylor 5'x22'.
DRIERS: Struthers-Wells 7'x64'; others 7'x20' 6'x80', 7'x20', 6'x40' and Cedar Rapids 60"x24'

SHOVELS—CRANES—DRAGLINES

N-W 80-D 2½ yd. Dragline. Diesel. 100' boom.
N-W Model 6, 1¼ yd. Diesel Shovel.
Lima Mod. 34, 1 yd. Shovel-Crane-Dragline. Gas
Link-Belt K-375 2 yd. Diesel Dragline.
Northwest 80-D Diesel Shovel 2½ yd. Recond.
Link Belt K580 Shovel. 1948—practically new
Bay City Model 65, 1½ yd. shovel, diesel Rebuilt.
Bay City 45 Shovel-Backhoe-Crane. Diesel.
Lima 1201, 2½ yd. Diesel Shovel.
Lorain L80 Shovel. 1¾ yd. complete overhaul
Link Belt K-505 dragline, 2½ yd., 8 ft. boom
Lima 802, Shovel-Crane-Drag. 2 yd. Diesel
Koehring 304 Diesel Shovel, ¾ yd.

SCREENS

Kennedy Van Saun 5' x 10' double deck.
Diamond 4' x 10', three deck.
Kennedy Van Saun 4' x 10', four deck.
Simplicity 5' x 12', double deck.
Seco double deck 4'x14'
A-C 5'x16' double deck Riple-Flo screen
Tyler Model F-600 TYROCK 5' x 14' double deck
A-C 5'x14' 3 deck riple-flo.

TRACTORS

2 Cat. D8 Angledozers with DDPCU rebuilt.
Int. TD-18A with B-E Bulldozer.
Int. TD-24 with B-E Cable Bulldozer.
Al-Chal HD19 Angledozer, Hydraulic.
Al-Chal HD7 with Gar Wood angledozer.
Allis-Chal. HD-19 with hydraulic control angledozer
Cat. D4 Tractavator with 1 yd. bucket, hydraulic

LOCOMOTIVES

45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
Vulcan 20 ton standard gauge type 0-4-0 gas.
20 ton Vulcan gas, std. ga., rebuilt.
25 ton Vulcan steam std. ga. Side tank.
15 ton Whitcomb 36" ga. gas.
Plymouth Model ULDA standard gauge 10 ton diesel.

DERRICKS

American Terry 20 ton Guy Derrick 100' bm
Clyde 30 ton stiff leg 90 ft. boom
Guy Derrick 15 tons 115' mast 105' boom
American 25 ton stiff leg derrick 90' boom
Special 35 ton stiff leg derrick 100' boom
Nat'l. Bridge 30 ton Guy Derrick 100 ft
American 30 ton stiff leg 100 boom

ASPHALT PLANTS

Butler 100 yd. Blitz Concrete plant.
Cedarapids 60"x24 a-sphalt plant drier Compt
Overmander Mountrole Hill Mixing Plant, T-34.
Model S-100 Simplicity. Diesel powered.
Hetherington-Berner Moto-Paver
McCarter complete plant 3000# capacity
Barber Greene 830-840. Complete Plant.
Cummer Semi-Port. 1500#.
Cedar Rapids Travel Roadmix Plant Model 50.

CABLEWAYS

Sauerman slack line 1¼ cl ; electric 90' mast
Sauerman 1 yd. with 100 hp. electric motor, complete.
Sauerman 1 yd. with Waukesha gas hoist.

RICHARD P. WALSH CO.

30 Church St. New York, N. Y.
Cortlandt 7-0723 Cable: RICHWALSH

---

28 SURPLUS NEW BELT CONVEYORS

24 INCH—1-1100' Long.
36 INCH 1-160'—2-250'—1-320'—1-400'—1-500' —2-1000' & 1-1800' Long.
42 INCH 1-144'—1-260'—1-377'—1-575'—2-780' 1-800'—2-1500' Long.
60 INCH 1-85'—1-500' Long.
EXTRA IDLERS, TERMINALS & BELTS

10 SURPLUS NEW MERRICK E WEIGHTOMETERS

For 18-24-30-36-42 inch Belt.

CLYDE HYDRATOR WITH KUNTZ CONTINUOUS DUSTLESS SYSTEM, 4-5 T.P.H.
NO. 1 RAYMOND AUTO PULVERIZER WITH THROWOUT, SEPARATOR & CYCLONE.
KUNTZ 5 x 20 CONTINUOUS HYDRATOR.
NO. 4 CLYDE BATCH HYDRATOR.
3 ROLL BRADLEY HERCULES JR. PULVERIZER.

ROTARY KILNS OR DRYERS

1—4'x20', 2—4'x45', 1—4'x60'
1—6'x60', 2—5½'x7'x60', 1—8'x80'.

LOCOMOTIVES

9—4 TON AND 8 TON GOODMAN, 36 IN., GAUGE BATTERY LOCOMOTIVES.
65 TON G.E. DIESEL ELEC.
10 TON DAVENPORT GAS.
20 TON WHITCOMB GAS.
6 TON BROOKVILLE DIESEL.
2 100 TON G.E. DIESEL ELEC.
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18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
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30"	6	1/8"	1/16"	32 Oz.
36"	4	1/8"	1/16"	32 Oz.
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6—#1, #0, #00, #000 Raymond Mills.

3—#0, #00, 8″ Raymond Screen Mills.

2—#51 Raymond Imp Mills.

2—Mikro #2TH, #4TH.

BALL AND TUBE MILLS:

6—Hardinge Mills, 3′ x 8″, 5′ x 22″, 6′ x 22″, 8′ x 48″.

4—Tube Grinding Mills, made by Traylor E. & M. Co., Allentown, Pa. Silex lined, 4′ x 13′, 4′6″ x 18′6″, 5′ x 22′ and 5′ x 20′.

8—Pebble Mills, porcelain lined; 3—6′ dia. x 8′, 800 gals. each. 1—6′ x 5′, 3—5′ x 4′, each with ball charge.

AIR SEPARATORS:

2—Raymond 6′ and 16′ dia.; 1—8′ Gayco; 1—16′ Sturtevant.

VIBRATING SCREENS:

3—Selectro 3′ x 8′ 2-deck; 1—3′ x 8′, 1-deck, all totally enclosed, heavy duty.

1—3′ x 6′ Colorado Iron Works, 1-deck.

2—4′ x 10′ Tyler Niagara, 2-decks.

8—Tyler Hummer, 3′ x 5′, 4′ x 5′, 4′ x 10′. Also #38 4′ x 10′.

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2—2 stage Washing Classifiers, each with two rakes in tandem, in steel trough 26′6″ long x 3′ wide, with drives.

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2—Reeves 7′ x 120′ x ⅝″ Rotary Kilns.

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1—Vulcan 5′6″ x 25′ x ½″ Rotary Kiln.

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Champion 1930 jaw crusher, roller bearing.

Traylor type H 9″ x 16″ jaw crusher.

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Double roll crusher, 24″ x 14″, smooth faces.

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Double roll cinder crusher, 12″ dia. 18″ face.

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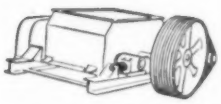

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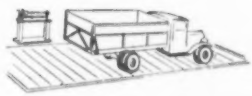

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30"	4	1/8"	1/32"	28 oz.	3.97 ft.
36"	4	1/8"	1/32"	28 oz.	4.70 ft.
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